1269081

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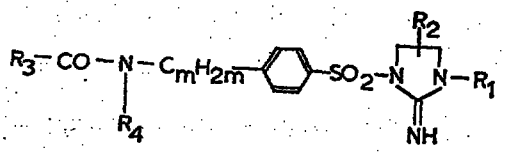
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(54) P-AMINOALKYLBENZENE SULFONAMIDE DERIVATIVES THEIR PREPARATION AND COMPOSITION CONTAINING SAME

(71) We, J. R. GEIGY A. G., a body corporate organised according to the laws of Switzerland, of 215, Schwarzwaldallee, Basle, Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to new derivatives of *p*-aminoalkylbenzene sulfonamide, processes for their preparation, medicaments containing the new compounds and their use.

More particularly, the present invention concerns compounds of the general formula I



(I)

in which

m is 2 or 3,

R_1 is an alkyl group with not more than 12 carbon atoms, an alkenyl group with 3 to 5 carbon atoms, an optionally alkyl-substituted cycloalkyl or cycloalkenyl group with not more than 7 carbon atoms or a phenylalkyl group with not more than 9 carbon atoms,

R_2 is hydrogen or a methyl or ethyl group,

R_3 is hydrogen, an alkyl group or chloroalkyl group with not more than 7 carbon atoms, an alkenyl group with not more than 5 carbon atoms, an optionally alkyl substituted cycloalkyl or cycloalkenyl group or a cycloalkyl-alkyl group with not more than 8 carbon atoms, a phenyl group or a phenylalkyl or phenylalkenyl group with not more than 10 carbon atoms, wherein the phenyl group can be mono-, di- or tri-substituted by halogen of atomic number up to and including 35, trifluoromethyl groups, alkyl groups with not more than 4 carbon atoms, hydroxyl groups, methoxy, ethoxy, methylthio or ethylthio, and

R_4 is hydrogen or the methyl group,

and their pharmaceutically acceptable acid addition salts.

The new compounds of the invention have been found to have hypoglycemic activities which are illustratively demonstrated in rats by orally administering the test compound to groups of 5 to 6 animals which have not been fed for 24 hours. Blood samples are taken from a vein of the animal and the blood sugar content is determined according to the method of Hagedorn-Jensen with an autoanalyser. Thus it is shown that 1 - {*p* - [2 - (*m* - methoxybenzamido) - ethyl] - phenylsulfonyl}-2 - imino - 3 - cyclohexyl - imidazoline on oral administration in amounts of from 20 to 400 mg/kg of bodyweight has a pronounced blood sugar lowering effect.

Similar hypoglycemic activities are found with the following preferred compounds:

1 - [*p* - (2 - butyramidoethyl) - phenyl - sulfonyl] - 2 - imino - 3 - propyl - imidazolidine,

1 - [*p* - [2 - (*m* - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine,

1 - [*p* - (2 - propionamido - ethyl) -

SPECIFICATION AMENDED - SEE ATTACHED SLIP

phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine,

1 - [*p* - (2 - butyramidoethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine,

1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - butylimidazolidine,

1 - [*p* - [2 - (2 - methyl - butyramido) - ethyl] - phenylsulphonyl] - 2 - imino - 3 - butyl - imidazolidine,

1 - [*p* - (2 - valeramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - butyl - imidazolidine,

1 - [*p* - (2 - valeramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine,

1 - [*p* - [2 - (2 - methoxy - 5 - chloro - benzamido - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine,

1 - [*p* - [2 - cyclohexane - carboxamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine,

1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine,

1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine,

1 - [*p* - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine,

1 - [*p* - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine,

1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine,

1 - [*p* - (2 - butyramido - ethyl - phenyl - sulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine,

1 - [*p* - (2 - valeramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclo - pentyl - imidazolidine,

1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine,

1 - [*p* - (2 - formamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine,

1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclo - hexyl - imidazolidine,

1 - [*p* - [2 - (N- methyl - acetamido) - propyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine,

1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclo - hexyl imidazolidine,

1 - [*p* - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclo - hexyl - imidazolidine,

1 - [*p* - (2 - valeramido - ethyl) - phenyl - sulfonyl] - 2 - imido - 3 - cyclo - hexyl - imidazolidine,

1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclo - hexyl - imidazolidine,

1 - [*p* - (2 - benzamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine,

1 - [*p* - (2 - (*m* - methoxy - benzamido) - ethyl] - phenylsulfonyl - 2 - imino - 3 - cyclohexyl - imidazolidine,

1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine,

1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine,

1 - [*p* - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine,

1 - [*p* - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclo - hexyl - 5 - methyl - imidazolidine,

1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3- butyl - 4 - ethyl - imidazolidine,

1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine,

1 - [*p* - (2 - valeramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine, and

1 - [*p* - (2 - valeramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine

The toxicity of the compounds of the invention on oral administration as demonstrated in rats is of favorable low order. These properties render the compounds of the invention suitable for the treatment of diabetes.

In the compounds of general formula I, R_1 can have the following meaning:

as alkyl group: the methyl, ethyl, propyl, isopropyl, butyl, sec. butyl, tert. butyl, isobutyl, pentyl, isopentyl, 2, 2 - dimethylpropyl, 1 - methyl butyl, 1 - ethyl - propyl - 1, 2 - dimethyl - propyl, hexyl, heptyl, octyl, tert. octyl, nonyl, decyl or the dodecyl group;

as alkenyl group: the allyl, 1 - methyl - allyl, 2 - methyl - allyl, butenyl or pentenyl group;

as an optionally alkyl-substituted cycloalkyl group: the cyclopropyl, cyclobutyl, cyclo - pentyl, 2- and 4 - methyl - cyclohexyl, cyclohexyl or the cycloheptyl group;

as an optionally alkyl-substituted cycloalkenyl group: the 2 - cyclopenten - 1 - yl, 2 - cyclohexen - 1 - yl, 3 - cyclohexen - 1 - yl, 2 - methyl - 2 - cyclohexen - 1 - yl or the 3 - cyclohepten - 1 - yl group;

as phenylalkyl group: the benzyl, phenethyl or the 2 - methyl - phenethyl group.

The substituent R_2 as alkyl group is the methyl or ethyl group and the substituent R_3 as alkyl group can be the alkyl groups named under R_1 with not more than 7 carbon atoms;

as chloroalkyl groups: the 1 - chloroethyl, 1 - chloropropyl, 1 - chlorobutyl, 1 - chloro - pentyl, 1 - chlorohexyl, 2 - chlorohexyl or the 1 - chloroheptyl group;

as cycloalkyl group: the cyclopropyl, cyclopropylmethyl, cyclobutyl, cyclobutylmethyl, cyclopentyl, cyclopentylmethyl, cyclohexyl, 2 - methylcyclohexyl, 4 - methylcyclohexyl, cyclohexylmethyl, cyclohexylethyl, cycloheptyl, cycloheptylmethyl, or the cyclooctyl group;

as cycloalkenyl groups: the 2 - cyclopenten - 1 - yl, 2 - cyclohexen - 1 - yl, 3 - cyclo - hexen - 1 - yl, 1 - methyl - 3 - cyclohexen - 1 - yl, 2 - methyl - 2 - cyclohexen - 1 - yl, 3 - methyl - 2 - cyclohexen - 1 - yl, 2 - cyclohepten - 1 - yl, 3 - cyclohepten - 1 - yl, 2 - cycloocten - 1 - yl or the 3 - cycloocten - 1 - yl group; as phenylalkyl or phenylalkenyl groups: the benzyl, phenethyl, phenylpropyl, phenylbutyl or the styryl group.

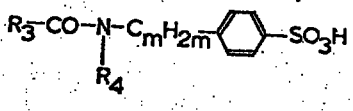
The phenyl group appearing in the definition of R_3 may be mono-, di- or tri-substituted. This substituent or these substituents can be the following groups:

as halogen: chlorine, fluorine or bromine;

as alkyl groups: the methyl, ethyl, propyl, isopropyl, butyl, isobutyl, sec. butyl or the tert. butyl group; and

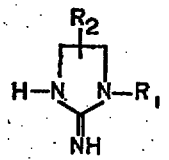
as alkoxy or alkylthio groups: the methoxy, ethoxy, methylthio or the ethylthio group.

According to an inventive method for preparation, compounds of general formula I are prepared by reaction of a reactive functional derivative of a sulfonic acid of general formula II



(II)

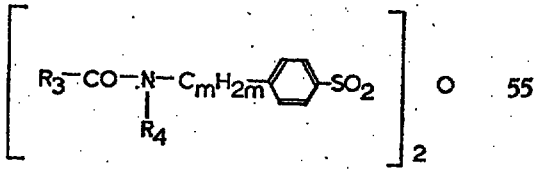
in which m, R_3 and R_4 have the meaning given under formula I with a compound of general formula III



(III)

in which R_1 and R_2 have the meaning given under formula I and, if desired, the reaction product can be converted with an inorganic or organic acid into a pharmaceutically acceptable addition salt.

As reactive functional derivative of a sulfonic acid of general formula II are suitable, e.g. a sulfonyl halide particularly a chloride, or also an anhydride of general formula IIa



(IIa)

in which m, R_3 and R_4 have the meaning given under formula I.

The reaction is preferably carried out in the presence of an inert organic solvent, which is miscible or immiscible with water, in the presence or the absence of water. Suitable inert organic solvents are hydrocarbons, such as benzene, toluene or xylene, etherlike solvents such as ether, dioxane or tetrahydrofurane, chlorinated hydrocarbons such as methylene-chloride and lower ketones at most 5 carbon atoms such as acetone or methylethylketone. It is preferable to add an acid binding agent to the reaction solution. As such are suitable inorganic bases or salts, e.g. alkali metal hydroxides, alkali metal hydrogen-carbonates, alkali metal carbonates or alkali metal phosphates, e.g., the sodium or potassium compounds. Additionally, there can also be used organic bases such as pyridine, trimethyl- or triethyl-amine, N, N - diisopropyl - ethyl - amine or collidine which are added in excess or which can also be used as solvent.

Starting materials of general formula II are compounds in which m, R_3 and R_4 are as defined under formula I. One group of sulfonylchlorides of the formula II, wherein R_3 is an alkyl group, can be prepared by reaction of a corresponding lower aliphatic carboxamides, which are substituted on the nitrogen atom by the phenylethyl or by the phenylpropyl group, with chlorosulfonic acid.

A second group of sulfonyl chlorides of general formula II, wherein R_3 is an optionally substituted phenyl group may be prepared by reacting an optionally substituted benzoylchloride with *p* - nitro - phenethylamine or with *p* - nitro - phenyl - propylamines to obtain the corresponding N - (*p* - nitro - phenethyl) - and N - (*p* - nitro - phenyl - propyl) - benzamides respectively. These nitro compounds are reduced with iron powder in hydrochloric acid to the corresponding N - (*p* - amino - phenylethyl) - and N - (*p* - amino - phenylpropyl) - benzamides respectively. The reaction products are finally di-

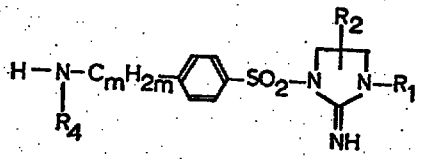
azotised with sodium nitrite in hydrochloric acid and diazonium salt solution is added to a solution of cupric chloride in water and glacial acetic acid which is saturated with sulfur dioxide.

According to a second inventive method for the preparation, compounds of general formula I are prepared by the reaction of an acid of general formula IV

$$R_3—COOH \qquad (IV)$$

in which

R_3 has the meaning given under formula I or a reactive functional derivative of such an acid with a compound of general formula V



(V)

in which

m, R_1, R_2 and R_4 have the meaning given under formula I and, if desired, the compound obtained is converted with an inorganic or organic acid into pharmaceutically acceptable addition salt. The acylation of compound V is carried out in a known manner, e.g. by reaction of the corresponding acid halides, -anhydrides or mixed-anhydrides, preferably in the presence of an acid binding or water binding agent or by treatment with reactive acid esters.

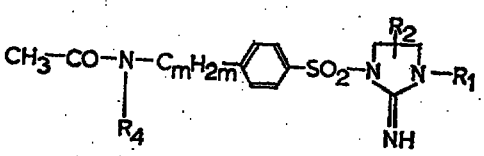
The reaction is preferably carried out in the presence of an inert organic solvent. Suitable inert organic solvents are hydrocarbons such as benzene, toluene or xylene, ether-like solvents such as ether, dioxane or tetrahydrofurane, chlorinated hydrocarbons such as methylene chloride and lower ketones containing at most 5 carbon atoms, such as acetone or methylethylketone. It is preferable to add to the reaction solution an acid binding agent, such as inorganic bases or salts, e.g. alkali metal hydroxides, alkali metal hydrogen carbonates, alkali metal carbonates or alkali metal phosphates, such as the sodium or potassium compounds. Additionally, there can be used organic bases such as pyridine, trimethyl- or triethyl-amine, N, N - diisopropylethylamine or collidine which can be used as solvent if added in excess.

To carry out these methods, an acid of general formula IV is reacted with a compound of general formula V in the presence of a carbodiimide such as dicyclohexylcarbodiimide in an inert solvent such as tetrahydrofuran. Lower alkyl esters containing at most 5 carbon atoms in the alkyl moiety, e.g. methyl ester or the ethyl ester of the acids of general formula IV yield on heating with compounds of general formula V, the corresponding substituted amides of general formula I.

In a variant of the reaction method the halide or anhydride (particularly a mixed anhydride with a carbonic acid half ester) is reacted with a compound of general formula V, preferably in the presence of an acid binding agent, e.g. a strong tert. organic base like triethylamine, pyridine or 2, 4, 6 - collidine, which, if added in excess, can also serve as the reaction medium.

Reactive esters of acids of general formula IV are the *p* - nitro - phenylester and the cyanomethylester.

The starting materials of general formula V mentioned above, which are described and claimed in our co-pending application No. 42742/71, Serial No. 1269082, are obtained by hydrolysis of the compounds falling under the general formula Ia'

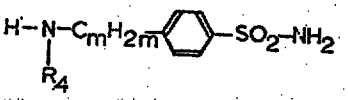


(Ia')

in which

m, R_1, R_2 and R_4 have the meaning given under formula I.

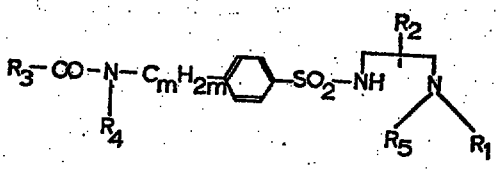
According to another method for preparation, one obtains starting materials of general formula V by reaction of substituted *p* - (amino - alkyl) - benzenesulfonamides of general formula VI



(VI)

in which the symbols m and R_4 have the meaning given under formula I with substituted N - 2 - bromoalkyl - cyanamides in alkaline medium [lit.: E. Miller et al. J. am. chem. Soc. 62, 2101 (1940)].

According to a third method for preparation, compounds of general formula I are prepared by condensation of compounds of general formula VII



(VII)

in which

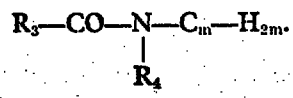
m, R_1, R_2, R_3 and R_4 have the meaning given under formula I, and

R_5 is hydrogen, an arylmethyl, diarylmethyl or a triarylmethyl group, the methyl or the allyl group, with a reactive cyanic acid derivative to cause ring closure and, if desired converting the compound of formula I obtained into a pharmaceutically acceptable acid addition salt thereof. R_5 is preferably the benzyl, benzhydryl or the trityl group.

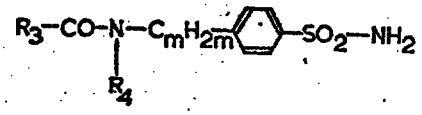
As reactive cyanic acid derivatives, there are most suitably cyanogen halides, such as cyanogen chloride or cyanogen bromide or cyanic acid esters, particularly cyanic acid phenyl ester. The reaction is preferably carried out in the presence of an inert organic solvent which is miscible or immiscible with water, in the presence or absence of water.

Suitable inert organic solvents are hydrocarbons such as benzene, toluene or xylene; lower alkanols containing at most 5 carbon atoms, such as methanol or ethanol; ether like solvents such as ether, dioxane or tetrahydrofuran; chlorinated hydrocarbons such as methylene chloride; lower ketones containing at most 5 carbon atoms, such as acetone or methylethylketone; carbonic acid esters such as ethyl acetate; carbonic acid nitriles such as acetonitrile; or sulfones, such as tetrahydrothiophene - 1, 1 - dioxide. The reaction can be carried out in the presence or absence of an acid binding agent. As acid binding agents there are suitable inorganic bases or salts such as alkali metal hydroxides, alkali metal hydrogen carbonates, alkali metal carbonates or alkali metal phosphates, e.g. the sodium or potassium compounds. Additionally, there can also be used calcium carbonate, calcium phosphate and magnesium carbonate.

As starting materials of general formula VII, there are most suitably such compounds in which the symbols m, R_1, R_2, R_3 or R_5 and R_4 are in accordance with the symbols which are named after formulae I and VII. A group of such starting materials are N - (2 - amino - ethyl) - benzenesulfonamides, the benzene ring of which is substituted in paraposition by the alkylamido group



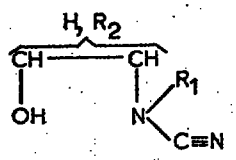
According to a fourth inventive method for preparation, compounds of general formula I are prepared by reacting with ring formation a compound of general formula VIII



(VIII)

in which

m, R_3 and R_4 have the same meaning as defined under formula I, with a reactive ester of a hydroxy compound of general formula IX



(IX)

in which

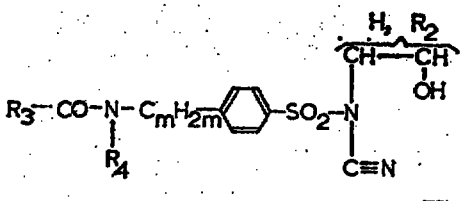
R_1 and R_2 have the same meaning given under formula I and when required, converting a *p* - aminoalkyl - benzenesulphonamide derivative having the formula I thus obtained into a pharmaceutically acceptable acid addition salt thereof.

Suitable reactive esters of hydroxy compounds of general formula IX are, e.g. halides, particularly chlorides or bromides, sulfonic acid esters, e.g. the *o*- or *p*-toluene sulfonic acid ester or the methane sulfonic acid ester.

The condensation is preferably carried out in a solvent which is miscible or immiscible with water, in the presence or absence of water. As solvents, there can be used alkanols, e.g. butanol; ether-like solvents e.g. dioxane; diethyleneglycolmonomethyl ether, carbonic acid amides such as N, N - dimethylformamide or sulfoxides, such as dimethylsulfoxide. It is preferable to carry out the condensation in the presence of an acid binding agent. As such can be used compounds which are named after the third method for preparation, also there can be used tert. organic bases such as, e.g. N, N - diisopropylethylamine.

As starting materials for the fourth method for preparation there can be used reactive esters which have been named herein before of a hydroxy compound of general formula IX in which symbols R_1 and R_2 are in accordance with the symbols which are named after formula I. A group of bromides of general formula IX may be prepared if a 1 - alkyl - aziridine [see A. Weissberger, Heterocyclic Compounds with Three and Four-Membered Rings, Part One, John Wiley Sons Inc., London (1964)] is reacted with cyanogen bromide in dioxane.

According to a fifth inventive method for preparation, compounds of general formula I are prepared by reacting, with ring formation, a compound of general formula X



(X)

in which

m, R_2, R_3 and R_4 have the meaning given

under formula I with an amine of formula XI

$$R_1—NH_2 \qquad (XI)$$

in which R_1 has the meaning given under formula I, and, when required, converting a *p* - amino - alkyl - benzene - sulfonamide derivative having the formula I thus obtained into a pharmaceutically acceptable acid addition salt thereof.

Suitable reactive esters of a hydroxy compound of general formula X are, e.g. halides, particularly chlorides or bromides, or sulfonic acid esters, particularly a benzene sulfonic acid ester which is substituted in para-position by the amidoalkyl group

$$R_3—CO—\underset{\displaystyle R_4}{\underset{|}{N}}—C_mH_{2m}—.$$

The condensation is preferably done in a solvent. As such there are suitable the same solvents which are named in the fourth method for preparation.

The reaction is preferably carried out in the presence of an acid binding agent. As an acid binding agent there is most suitably an excess of a base of general formula XI.

As starting materials for this method for preparation, there are reactive esters, which have been named hereinbefore, of hydroxy compounds of general formula X, in which symbols *m*, R_2, R_3 and R_4 are in accordance with the symbols which are named after formula I.

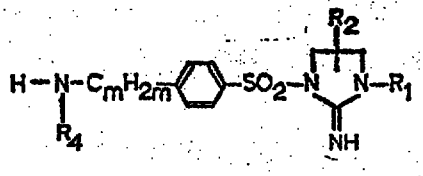
A group of such compounds can be prepared in the following way:

One starts with aziridine and reacts this with cyanogen bromide in ether to obtain the N - (2 - bromoethyl) - cyanamide; this cyanamide is condensed in acetone with a benzene sulfonyl chloride which is substituted in para-position by the group

$$R_3—CON—\underset{\displaystyle R_4}{\underset{|}{}}—C_mH_{2m}—$$

in the presence of diluted sodium hydroxide causing removal of hydrogen chloride to yield the corresponding N - (2 - bromoethyl) - N - cyanobenzenesulfonamide.

According to a sixth method, compounds of general formula I in which R_3 is only hydrogen are prepared by formylation of compounds of general formula V



(V)

in which *m*, R_1, R_2 and R_4 have the same meaning given under formula I with chloral and, when required, converting a *p* - amino - alkyl - benzenesulfonamide derivative having the formula I thus obtained into a pharmaceutically acceptable acid addition salt thereof. The formylation is done according to Blicke, Am. Soc. 74, 3933 (1952) in an inert solvent, e.g. in dioxane, tetrahydrofuran, benzene, toluene or chlorinated hydrocarbons e.g. methylene chloride.

Starting materials of general formula XII are prepared according to the methods as they are described after the second method for preparation, preferably by hydrolysis of the corresponding substituted 1 - [*p* - (2 - acet - amido - alkyl) - phenylsulfonyl] - 2 - imino - imidazolidines of general formula Ia.

The compounds of general formula I are converted if desired into the pharmaceutically acceptable salts with inorganic or organic acids. The preparation of these salts can be accomplished by reaction of compounds of general formula I with an equivalent amount of acid in a suitable aqueous-organic or inorganic solvent like methanol, ethanol, diethylether, chloroform or methylene chloride.

For use as medicaments instead of the free compounds of the general formula, their pharmaceutically acceptable salts with acids may be used.

Suitable addition salts are salts with hydrochloric acid, hydrobromic acid, sulfuric acid, phosphoric acid, methanesulfonic acid, ethanesulfonic acid, β - hydroxyethanesulfonic acid, acetic acid, lactic acid, oxalic acid, succinic acid, fumaric acid, maleic acid, hydroxysuccinic acid, tartaric acid, citric acid, salicylic acid, phenylacetic acid, mandelic acid and embonic acid, addition salts with blood sugar depressing sulfonyl ureas e.g. N^1 - *p* - tolyl - sulfonyl - N^2 - butyl - carbamide, N^1 - *p* - chlorobenzenesulfonyl - N^2 - propyl - carbamide, and N^1 - *p* - [2 - (2 - methoxy - 5 - chlorobenzamido) - ethyl] - phenyl - sulphonyl - N^2 - cyclohexyl - carbamide.

In a further aspect therefore, the present invention provides a pharmaceutical composition comprising a *p* - amino - alkyl - benzene - sulfonamide derivative of formula I defined above, or a pharmaceutically acceptable addition salt thereof, together with a pharmaceutically acceptable diluent or carrier therefor.

The new compounds are preferably administered orally. The daily doses are between 30 and 300 mg for adult patients with normal weight. Suitable dosage forms like dragées and tablets, contain preferably 30 to 300 mg of a compound of the invention, i.e. 20 to 80% of a compound of general formula I, or a pharmaceutically acceptable acid addition salt thereof.

For their preparation, the active compound is combined, e.g. with a solid powdery carrier like lactose, saccharose, sorbitol, mannitol,

starch, such as potato starch, corn starch or amylopectin, also laminaria powder or citrus pulp powder; cellulose derivatives or gelatine, if desired under addition of lubricants like magnesium or calcium stearate or polyethylene glycols to form tablets or dragées cores. The last-named are coated with concentrated solutions of sugar which may also contain some arabic gum, talc or titanium dioxide or with a volatile organic solvent or mixtures of solvents which contain dissolved lacquer. It is possible to add to these coatings pigments to mark different doses of the active ingredients.

As other oral dosage forms there are suitable capsules of gelatine and a softening agent like glycerine. Plugged capsules contain the active ingredient preferably as granulate e.g. in mixture with fillers like corn starch and/or lubricants like talc or magnesium stearate and, if desired, stabilizers like sodium meta-bisulphite ($Na_2S_2O_5$) or ascorbic acid. In the soft capsules the active ingredient is preferably dissolved or suspended in suitable solvents like liquid polyethyleneglycols whereby if desired stabilizers can be added.

The following prescriptions describe the preparation of tablets and dragées in more detail:

a) 1000 g of 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine are mixed together with 500 g lactose and 270 g of potato starch. The mixture is moistened with an aqueous solution of 8.0 g gelatine and granulated through a filter. After drying, it is mixed together with 60.0 g potato starch, 60.0 g talc, 10.0 g magnesium stearate and 20.0 g colloidal silicon dioxide. After this, the mixture is pressed into 10,000 tablets, each of which has a weight of 200 mg and contains 100 mg active ingredient, if desired, the tablets may be grooved for better adaptation to dosages.

b) From 1,000 g 1 - *p* - [2 - (3 - meth - oxy - benzamido) - ethyl] - phenyl - sulfonyl - 2 - imino - 3 - cyclohexyl - imidazolidine, 345.0 g lactose and an aqueous solution of 6.0 g gelatine, a granulate is prepared which after drying is mixed together with 10.0 g colloidal silicon dioxide, 40.0 g talc, 40.0 g potato starch and 5.0 g magnesium stearate and pressed into 10,000 dragée cores. These are coated afterwards with a concentrated syrup of 533.0 g crystalline saccharose, 20.0 g shellac, 75.0 g gum arabic, 250 g talc, 20 g colloidal silicon dioxide and 1.5 g dye and dried. The dragées obtained each weigh 240 mg and each contain 100 mg active ingredient.

The following examples describe the preparation of the new compounds of formula I and of intermediates therefor. The temperatures are given in °C.

EXAMPLE 1

a) One adds 17.8 g 1 - butyl - 2 - imino - imidazolidine - hydrochloride to 8.5 g sodium hydroxide in 85 ml water. To the obtained clear solution are added 26.2 g *p* - (2 - acetamido - ethyl) - benzenesulfonylchloride, dissolved in 100 ml acetone, whereby the reacted mixture shows a rise in temperature. It is heated for half an hour to 90° and then evaporated *in vacuo*. The residue is recrystallized from ethyl acetate and the pure 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl imidazolidine is obtained which has a m.p. 130—131°.

Accordingly one obtains from:

16.3 g 1 - propyl - 2 - imino - imidazolidine - hydrochloride and 24.8 g *p* - (2 - formamido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 103—104°;

16.3 g 1 - propyl - 2 - imino - imidazolidine - hydrochloride and 29.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - butyramidoethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, H_2O, m.p. 114—116°;

16.3 g 1 - isopropyl - 2 - imino - imidazolidine - hydrochloride and 24.8 g *p* - (2 - formamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - 2 - formamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine, m.p. 112—113°;

16.3 g 1 - isopropyl - 2 - imino - imidazolidine - hydrochloride and 27.6 g *p* - (2 - propionamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - propionamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine, m.p. 111—112°;

16.3 g 1 - isopropyl - 2 - imino - imidazolidine - hydrochloride and 29.0 g *p* - (2 - butyramido - ethyl - benzenesulfonyl - chloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine, m.p. 139—140°;

14.3 g 1 - butyl - 2 - imino - imidazolidine and 24.8 g *p* - (2 - formamido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 111—112°;

17.7 g 1 - butyl - 2 - imino - imidazolidine - hydrochloride and 27.55 g *p* - (3 - acetamido - propyl) - benzene - sulfonyl - chloride the 1 - [*p* - (3 - acetamido - propyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 92—93°;

14.3 g 1 - isobutyl - 2 - imino - imidazolidine and 24.8 g *p* - (2 - formamido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - formamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 107—108°;

17.8 g 1 - butyl - 2 - imino - imidazolidine - hydrochloride and 27.6 g *p* - (2 -

acetamido - propyl) - benzenesulfonylchloride the 1 - [*p* - (2 - acetamido - propyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 120—122°;

17.8 g 1 - butyl - 2 - imino - imidazol - idine - hydrochloride and 27.6 g *p* - (2 - propionamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 137—138°;

17.8 g 1 - butyl - 2 - imino - imidazol - idine- hydrochloride and 28.9 g *p* - (2 - butyramido - ethyl) - benzenesulfonylchloride the 1 - [p - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - butyl - imidazol - idine, m.p. 123—124°;

17.8 g 1 - butyl - 2 - imino - imidazol - idine - hydrochloride and 27.6 g *p* - (2 - α - methylbutyramido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - α - methyl - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 114—116°;

17.8 g 1 - butyl - 2 - imino - imidazol - idine - hydrochloride and 30.4 g *p* - (2 - valeramido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - butyl - imidazol - idine, m.p. 130°;

22.2 g 1 - isobutyl - 2 - imino - imidazol - idine - hydrobromide and 26.15 g *p* - (2 - acetamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imid - azolidine, m.p. 149—151°;

22.2 g 1 - isobutyl - 2 - imino - imidazol - idine - hydrobromide and 27.55 g *p* - (3 - acetamido - propyl) - benzenesulfonylchloride the 1 - [*p* - (3 - acetamido - propyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, as oil;

22.2 g 1 - isobutyl - 2 - imino - imidazol - idine - hydrochloride and 30.4 g *p* - (2 - valeramido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 137—140°;

22.2 g 1 - isobutyl - 2 - imino - imidazol - idine - hydrochloride and 39.0 g *p* - [2 - (2 - methoxy - 5 - chlorobenzamido) - ethyl] - benzenesulfonylchloride the 1 - [*p* - [2 - (2 - methoxy - 5 - chlorobenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 117.5—119°;

22.2 g 1 - isobutyl - 2 - imino - imidazol - idine - hydrochloride and 33.0 g *p* - (2 - cyclohexane - carbamido - ethyl) - benzene - sulfonylchloride the 1 - [*p* - [2 - (cyclo - hexane - carboxamido) - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imid - azolidine, m.p. 175—177°;

17.75 g 1 - sec. butyl - 2 - imino - imid - azolidine - hydrochloride and 26.15 g *p* - (acetamido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - sec. butyl - imid - azolidine, m.p. 106—108°;

17.8 g 1 - sec. butyl - 2 - imino - imid - azolidine - hydrochloride and 27.6 g *p* - (2 - propionamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 125—126°;

17.8 g 1 - sec. butyl - 2 - imino - imidazol - idine - hydrochloride and 29.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 123—124°;

22.2 g 1 - tert. butyl - 2 - imino - imidazol - idine - hydrobromide and 26.15 g *p* - (2 - acetamido - ethyl) - benzenesulfonylchloride the 1 - [p - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 129—130°;

22.2 g 1 - tert. butyl - 2 - imino - imid - azolidine, hydrochloride and 29.0 g *p* - (2 - isovaleramido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 152—154°;

15.5 g 1 - cyclopentyl - imino - imidazol - idine and 24.8 g *p* - (2 - formamido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 108—110°;

18.97 g 1 - (cyclopentyl - 2 - imino - imidazolidine - hydrochloride and 26.15 g *p* - (2 - acetamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclo - pentyl - imidazolidine, m.p. 151—152°;

18.9 g 1 - cyclopentyl - 2 - imino - imid - azolidine - hydrochloride and 29.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenyl - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclo - pentyl - imidazolidine, m.p. 138—139°;

20.5 g 1 - cyclohexyl - 2 - imino - imid - azolidine - hydrochloride and 24.8 g *p* - (2 - formamido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - formamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclohexyl - imid - azolidine, m.p. 135—136°;

20.37 g 1 - cyclohexyl - 2 - imino - imid - azolidine - hydrochloride and 26.15 g *p* - (2 - acetamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclo - hexyl - imidazolidine, m.p. 181—183°;

20.37 g 1 - cyclohexyl - 2 - imino - imidazolidine - hydrochloride and 29.0 g *p* - [2 - (N - methyl - acetamido) - propyl] - benzenesulfonylchloride the 1 - [*p* - [2 - (N - methyl - acetamido) - propyl] - phenyl - sulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine, m.p. 108—110°;

21.8 g 1 - cyclohexyl - 4 - methyl - 2 - imino - imidazolidine - hydrochloride and 29.0 g *p* - (2 - butyramido - ethyl) - benzene - sulfonyl chloride the 1 - [*p* - (2 - butyr - amido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - 5 - methyl - imidazolidine, m.p. 109—111°;

20.5 g 1 - cyclohexyl - 2 - imino - imid - azolidine - hydrochloride and 30.4 g *p* - (2 - valeramido - ethyl) - benzenesulfonylchloride the 1 - [p - (2 - valeramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclo - hexyl - imidazolidine, 1/4 H_2O, m.p. 154—155°;

20.5 g 1 - cyclohexyl - 2 - imino - imid - azolidine - hydrochloride and 30.4 g *p* - (2 - isovaleramido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine, m.p. 180—181°;

20.5 g 1 - cyclohexyl - 2 - imino - imid - azolidine - hydrochloride and 33.0 g *p* - (2 - cyclohexancarboxamido - ethyl) - benzene - sulfonylchloride the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine, m.p. 208—209°;

20.37 g 1 - cyclohexyl - 2 - imino - imidazolidine - hydrochloride and 35.4 g *p* - [2 - (m - methoxy - benzamido) - ethyl] - benzenesulfonylchloride the 1 - [*p* -[2 - m - methoxy - benzamido) - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine, m.p. 167—168°;

18.1 g 1 - cycloheptyl - 2 - imino - imid - azolidine and 24.8 g *p* - (2 - formamido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine, m.p. 130—133°;

21.77 g 1 - cycloheptyl - 2 - imino - imidazolidine - hydrochloride and 26.15 *p* - (2 - acetamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine, m.p. 166—167°;

21.8 g 1 - cycloheptyl - 2 - imino - imid - azolidine - hydrochloride and 29.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonylchloride the 1 - [p - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclo - heptyl - imidazolidine, m.p. 144.5—145°;

23.6 g 1 - butyl - 5 - methyl - 2 - imino - imidazolidine - hydrobromide and 26.15 g *p* - (2 - acetamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine, m.p. 132—133°;

25.0 g 1 - butyl - 5 - ethyl - 2 - imino - imidazolidine - hydrobromide and 26.15 g *p* - (2 - acetamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine, m.p. 111—114°;

19.2 g 1 - butyl - 4 - methyl - 2 - imino - imidazolidine - hydrochloride and 26.2 g *p* - (2 - acetamido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine, m.p. 98—99°;

23.6 g 1 - butyl - 5 - ethyl - 2 - imino - imidazolidine - hydrobromide and 30.4 g *p* - (2 - valeramido - ethyl) - benzenesulfonyl - chloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine, m.p. 92—94°;

18.3 g 1 - (2 - methyl - cyclohexyl) - 2 - imino - imidazolidine and 24.8 g *p* - (2 - formamido - ethyl) - benzenesulfonylchloride the 1 - [*p* - (2 - formamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - (2 - methyl - cyclohexyl) - imidazolidine, m.p. 127—129°;

18.3 g 1 - (4 - methylcyclohexyl) - 2 - imino - imidazolidine and 24.8 g *p* - (2 - formamido - ethyl) - benzenesulfonylchloride the 1 - [p - (2 - formamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - (4 - methyl - cyclohexyl) - imidazolidine, m.p. 126—128°;

26.4 g 1 - (4 - methyl - cyclohexyl) - 2 - imino - imidazolidine - hydrochloride and 26.2 g *p* - (2 - acetamido - ethyl) - benzene - sulfonylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulphonyl] - 2 - imino - 3 - (4 - methyl - cyclohexyl) - imidazolidine, m.p. 166—167°.

The *p* - (2 - acetamido - ethyl) - benzene - sulfonylchloride which is used as starting material is obtained according to the following procedure:

b) 16.3 g N - phenethyl - acetamide are added portionwise while stirring to 35.0 g chlorosulfonic acid. Thereafter the mixture is stirred for 2 hours at 60° and then poured on ice. The crystals are filtered off, washed with water and dried *in vacuo*. The *p* - (2 - acetamido - ethyl) - benzenesulfonylchloride obtained is used as crude product.

In analogous way one obtains the sulfonylchlorides used as starting material which are worked up as crude products: From 14.9 g N - phenethyl - formamide and 35.0 g chlorosulfonic acid the *p* - (2 - formamido - ethyl) - benzenesulfonylchloride;

from 17.7 g 1 - phenyl - 2 - acetamido - propane and 35.0 g chlorosulfonic acid the *p* - (2 - acetamido - propyl) - benzene - sulfonyl chloride;

from 18.7 g N - (3 - phenyl propyl) - acetamide and 35.0 g chlorosulfonic acid the *p* - (3 - acetamido - propyl) - benzene - sulfonylchloride;

from 19.1 g N - (3 - phenyl - propyl) - N - methylacetamide and 35.0 g chlorosulfonic acid the p - [2 - (N - methylacetamido - propyl] - benzenesulfonylchloride;

from 17.7 g N - phenethyl - propionamide and 35.0 g chlorosulfonic acid the *p* - (2 - propionamido - ethyl) - benzenesulfonyl - chloride;

from 19.1 g N - phenethyl - butyramide and 50.0 g chlorosulfonic acid the *p* - (2 - butyramido - ethyl) - benzenesulfonylchloride;

from 20.5 g N - phenylethyl - valeramide and 35.0 g chlorosulfonic acid the *p* - (2 - valeramido - ethyl) - benzenesulfonylchloride;

from 20.5 g N - phenylethyl - isovaler - amide and 35.0 g chlorosulfonic acid the *p* - (2 - isovaleramido - ethyl) - benzenesulfonyl - chloride;

from 23.1 g N - phenylethyl - cyclohexane - carbamide and 35.0 g chlorosulfonic acid the *p* - (2 - cyclohexane - carbamido - ethyl) - benzene sulfonyl chloride;

Example 2

a) According example 1 a) one obtains from 17.8 g 1 - butyl - 2 - imino - imidazol - idine - hydrochloride in sodium hydroxide and 35.8 g p - [2 - (*o* - chlorobenzamido) - ethyl] - benzenesulfonylchloride the 1 - {*p* - [2 - (o - chlorobenzamido) - ethyl] - phenyl - sulfonyl} - 2 - imino - 3 - butyl - imidazol - idine, m.p. 155—157° (from isopropanol).

The sulfonyl chloride used as starting material is prepared according to the following procedure:

b) 17.6 g *o* - chlorobenzoylchloride are added to 20.3 g *p* - nitro - phenethylamine - hydrochloride in 30 ml 5-n. sodium hydroxide and 50.0 g ice. The N - (*p* - nitro - phen - ethyl) - *o* - chlorobenzamide crystallizes. It is suctioned off, washed with water, dried and used as crude product.

c) to 30.5 g of the obtained nitro compound according to method b) suspended in 85 ml ethanol are added 1 ml conc. hydrochloric acid and with 16.0 g iron powder it is refluxed for 12 hours. Then the reaction mixture is filtered and washed with ethanol. The filtrate is evaporated *in vacuo* and to the residue is added ethanolic hydrochloric acid. One obtains the N - (*p* - amino - phenethyl) - *o* - chlorobenzamide hydrochloride which is used as crude product.

d) To 31.0 g of the obtained hydrochloride according to method c) are added 100 ml glacial acetic acid and 34 ml concentrated hydrochloric acid. The solution is diazotized at 5° with 7.6 g sodium nitrite which is dissolved in 30 ml water. The obtained diazonium salt solution is added to a solution saturated with sulfur dioxide, 4.0 g cupric chloride, 7 ml water and 80 ml glacial acetic acid. A slight exothermic reaction ensues and at 35° nitrogen is split off. The reaction mixture is kept for 2 hours. The *p* - [2 - (*o* - chloro - benzamido) - ethyl] - benzenesulfonylchloride crystallizes. The crystals are suctioned off and washed with water and used as crude product.

Example 3

According to example 1 a) one obtains from 17.8 g 1 - tert. butyl - 2 - imino - imidazol - idine - hydrochloride and 35.8 g *p* - [2 - (o - chloro - benzamido) - ethyl] - benzene - sulfonylchloride the 1 - {*p* - [2 - (*o* - chloro - benzamido) - ethyl] - phenylsulfonyl} - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 152—154° (from ethanol).

Example 4

a) According example 1 a) one obtains from 17.8 g 1 - butyl - 2 - imino - imidazolidine - hydrochloride in sodium hydroxide and 35.4 g *p* - [2 - (*o* - methoxy - benzamido) - ethyl] - benzenesulfonylchloride the 1 - {*p* - [2 - (*o* - methoxy - benzamido) - ethyl] - phenylsulfonyl} - 2 - imino - 3 - butyl - imidazolidine, m.p. 145—146° (from methanol).

The sulfonyl chloride used as starting material is prepared according to the following method:

b) According to example 2 b—d) one obtains starting with 17.1 g *o* - methoxy - benzoylchloride and 20.3 g *p* - nitro - phen - ethyl - amine the N - (*p* - nitro - phenethyl) - *o* - methoxy - benzamide of m.p. 149—150° (from acetic acid ethylester); 30.0 g of this nitro compound are reduced with 16.0 g iron powder to yield the N - (*p* - amino - phen - ethyl) - o - methoxy - benzamide - hydro - chloride of m.p. 211—214° (from methanol) 30.5 g of which are diazotized in conc. hydrochloride acid with 7.6 g sodium nitrite; the diazonium salt solution yields with a solution of cupric chloride in water and glacial acetic acid which is saturated with sulfur dioxide the p - [2 - (o - methoxy - benzamido) - ethyl] - benzenesulfonylchloride which melts at 140—143° (crude product).

Example 5

a) According to example 1a) one obtains from 16.4 g 1 - propyl - 2 - imino - imidazol - idine - hydrochloride in sodium hydroxide and 35.4 g p - [2 - (*m* - methoxy - benzamido) - ethyl] - benzenesulfonyl - chloride the 1 - {*p* - [2 - (*m* - methoxy - benzamido) - ethyl] - phenylsulfonyl} - 2 - imino - 3 - propyl - imidazolidine, m.p. 144—147° (from ethyl acetate).

The sulfonylchloride used as starting material is prepared according the following procedure:

b) According example 2 b—d) one obtains starting with 17.1 g *m* - methoxy - benzoyl - chloride and 20.3 g *p* - nitro - phenethyl - amine the N - (*p* - nitro - phenethyl) - *m* - methoxy - benzamide m.p. 151—152° (from ethyl acetate); 30.0 g of this nitro compound are reduced with 16.0 g iron powder to yield the N - (*p* - amino - phenethyl) - *m* - meth -

oxy - benzamide - hydrochloride, m.p. 205—209° of which 30.5 g are diazotized in concentrated hydrochloric acid with 7.6 g sodium nitrite; the diazonium salt solution yields with a solution of cupric chloride in water and glacial acetic acid which is saturated with sulfurdioxide the p - [2 - (*m* - methoxy - benzamido) - ethyl] - benzenesulfonylchloride (crude product).

EXAMPLE 6

According to example 1 a) one obtains from 17.8 g 1 - butyl - 2 - imino - imidazol - idine - hydrochloride in sodium hydroxide and 35.4 g *p* - [2 - (*m* - methoxy - benzamido) - ethyl - benzenesulfonylchloride the 1 - {*p* - [2- (*m* - methoxy benzamido) - ethyl] - phenylsulfonyl} - 2 - imino - 3 - butyl - imidazolidine, m.p. 137—141° (from methanol).

EXAMPLE 7

According to example 1 a) one obtains from 17.8 g 1 - tert. butyl - 2 - imino - imidazol - idine - hydrochloride in sodium hydroxide and 35.4 g p - [2 - (*m* - methoxy - benzamido) - ethyl] - benzenesulfonylchloride the 1 - {*p* - [2 - (*m* - methoxy - benzamido) - ethyl] - phenylsulfonyl} - 2 - imino - 3 - tert. butyl - imidazolidine of m.p. 134—136° (from ethyl acetate).

EXAMPLE 8

a) According to example 1 a) one obtains from 17.8 g 1 - tert. butyl - 2 - imino - imidazolidine - hydrochloride in sodium hydroxide and 33.8 g *p* - [2 - (*o* - toluamido) - ethyl] - benzenesulfonylchloride the 1 - {*p* - [2 - (*o* - toluamido) - ethyl] - phenyl - sulfonyl} - 2 - imino - 3 - tert. butyl - imidazolidine of m.p. 160—161°.

The sulfonylchloride used as starting material is prepared according to the following procedure:

b) According to example 2 b—d) one obtains starting with 15.5 g *o*-toluoylchloride and 20.3 g *p* - nitro - phenethylamine the N - (*p* - nitro - phenethyl) - *p* - toluamide (crude product); 28.4 g of this nitro compound are reduced with 16.0 g iron powder to yield the N - (*p* - amino - phenethyl) - *o* - toluamide - hydrochloride (crude product) of which 28.4 g are diazotized in conc. hydrochloride acid with 7.6 g sodium nitrite; the diazonium salt solution yields with a solution of cupric chloride in water and glacial acetic acid which is saturated with sulfur dioxide the *p* - [2 - (*o* - toluamido) - ethyl] - benzenesulfonylchloride (crude product).

EXAMPLE 9

a) According to example 1 a) one obtains from 13.6 g 1 - methyl - 2 - imino - imidazolidine - hydrochloride in sodium hydroxide and 39.0 g *p* - [2 - methoxy - 5 - chloro - benzamido) - ethyl] - benzene - sulfonylchloride the 1 - {*p* - [2 - (2 - meth - oxy - 5 - chloro - benzamido) - ethyl] - sulfonyl} - 2 - imino - 3 - methyl - imidazol - idine of m.p. 140—141° (from ethyl acetate).

The sulfonyl chloride used as starting material is prepared according to the following procedure:

b) According to example 2 b—d) one obtains starting with 20.6 g 2 - methoxy - 5 - chlorobenzoylchloride and 20.3 g *p* - nitro - phenylamine the N - (*p* - nitro - phenethyl) - 2 - methoxy - 5 - chloro - benz - amide, m.p. 158—160° C; 30.0 g of this nitro compound are reduced with 16.0 g iron powder to yield the N - (*p* - amino - phenethyl) - 2 - methoxy - 5 - chlorobenzamide - hydro - chloride (crude product) of which 34.0 g are diazotized in conc. hydrochloride acid with 7.6 g sodium nitrite; the diazonium salt solution yields with a solution of cupric chloride in water and acetic acid which is saturated with sulfur dioxide the *p* - [2 - (2 - methoxy - 5 - chlorobenzamido) - ethyl] - benzenesul - fonylchloride (crude product).

EXAMPLE 10

According to example 1a) one obtains from 17.8 g 1 - butyl - 2 - imino - imidazolidine - hydrochloride in sodium hydroxide and 39.0 g *p* - [2 - (2 - methoxy - 5 - chlorobenz - amido) - ethyl] - benzenesulfonylchloride the 1 - {*p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - phenylsulfonyl} - 2 - imino - 3 - butyl - imidazolidine of m.p. 94—97° (from ethyl acetate).

EXAMPLE 11

According to example 1a) one obtains from 17.8 g 1 - tert. butyl - 2 - imino - imidazol - idine - hydrochloride in sodium hydroxide and 39.0 g *p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - benzenesulfonylchloride the 1 - {*p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - phenylsulfonyl} - 2 - imino - 3 - tert. butyl - imidazolidine of m.p. 120—122°.

The end product is purified by elution chromatography on silica gel with chloroform-ethanol (9:1) as elution solvent. From the first fractions one recovers unchanged starting material, from the last fractions the end product.

EXAMPLE 12

According to example 1 a) one obtains from 20.4 g 1 - cyclo - hexyl - 2 - imino - imid - azolidine - hydrochloride in sodium hydroxide and 39.0 g *p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - benzene - sulfonylchloride the 1 - {*p* - [2 - (2 - meth - oxy - 5 - chloro - benzamido) - ethyl] - phenylsulfonyl} - 2 - imino - 3 - cyclohexyl -

imidazolidine of m.p. 167—170° (from methanol).

EXAMPLE 13

According to example 1a) one obtains from 17.8 g 1 - tert. butyl - 2 - imino - imidazolidine - hydrochloride in sodium hydroxide and 41.4 g *p* - [2 - (3, 4, 5 - trimethoxy - benzamido) - ethyl] - benzenesulfonyl - chloride the 1 - {*p* - [2 - (3, 4, 5 - trimethoxy - benzamido) - ethyl] - phenylsulfonyl} - 2 - imino - 3 - tert. butyl - imidazolidine of m.p. 130—132° (from ethyl acetate ether).

The sulfonylchloride which is used as starting material is prepared according to example 9 b).

EXAMPLE 14

According to example 1a) one obtains from 17.8 g 1 - tert. butyl - 2 - imino - imidazolidine - hydrochloride in sodium hydroxide and 28.9 g *p* - (2 - butyrylamido - ethyl) - benzenesulfonylchloride the 1 - [p - (2 - butyrylamido -ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine of m.p. 148—149° (from ethyl acetate).

EXAMPLE 15

a) 38.1 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2-N sodium hydroxide. It is extracted with methylene chloride. To the methylene chloride solution which has been dried over sodium sulfate are added 50.5 g triethylamine. Thereafter to the reaction mixture is dropped at room temperature a solution of 9.3 g propionic acid chloride in 100 ml methylene chloride within 20 minutes. After stirring the solution for one hour at room temperature it is washed with 100 ml 2-N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylene chloride. The combined methylene chloride phases yield after drying with sodium sulfate, filtering and evaporating 1 - [*p* - (2 - propionamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - propyl - imidazolidine which melts at 127—129° after recrystallization from ethyl acetate.

In analogus way one obtains from 38.1 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - imino - 3 - propyl - imidazolidine - dihydrochloride and:

9.3 g propionyl - chloride the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine 1/6 H_2O= 130—134°,

10.7 g butyrylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - propyl - imidazolidine . H_2O, m.p. 113—116°;

12.1 g valeroylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 130—132°;

12.1 g isovaleric acid chloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 135—136°;

10.5 g cyclopropancarbonic acid chloride the 1 - [*p* - (2 - cyclopropan - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 142—143°;

14.7 g cyclohexylcarbonic acid chloride the 1 - [p - (2 - cyclohexylcarboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 144—146°;

15.5 g *o* - toluoylchloride the 1 - [*p* - [2 - (2 - toluamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 114—116°;

17.5 g *o* - chlorobenzoylchloride the 1 - [*p* - [2 - (2 - chlorobenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 145—146°;

21.9 g *o* - brombenzoylchloride the 1 - [*p* - [2 - (2 - brombenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 137—138°;

16.9 g 2, 5 - dimethylbenzoylchloride the 1 - [*p* - [2 - (2, 5 - dimethylbenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 117—118°;

14.1 g α - chlorbutyric acid chloride the 1 - [*p* - (2 - α - chlorobutyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 123—124°;

17.0 g *m* - methoxy - benzoylchloride the 1 - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 144—147°;

10.5 g 1 - methacryloylchloride the 1 - [*p* - [2 - (1 - methacrylylamide - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - propyl - imid - azolidine, m.p. 139—140°;

21.0 g 2, 4 - dichlorobenzoylchloride the 1 - [*p* - [2 - (2, 4 - dichloro - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine, m.p. 122—124°;

b) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine - dihydrochloride is obtained according to two methods:

1) 35.2 g 1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - propyl - imidazolidine are dissolved in 370 ml 2 - N. hydrochloric acid and the solution is refluxed for 6 hours. The solution is then evaporated *in vacuo* to dryness and the obtained oil dissolved in ethanol. On cooling the 1 - [*p* - (2 - amino - ethyl - benzene - sulfonyl] - 2 - imino - 3 - propyl) - imid - azolidine - dihydrochloride crystallizes, m.p. 255—256°.

2) A mixture of 100 ml dimethylsulfoxide, 11.2 g pulverized potassium hydroxide, 23.65

g *p* - (2 - amino - ethyl) - phenyl - sulfon - amide - hydrochloride [lit.: E. Miller et al, J. am. chem. Soc. 62, R101, (1940)] and 16 g N - (2 - chlor - ethyl) - N - propyl - cyan - amide is heated while stirring for one hour in an oil bath of 110°. After cooling one pours the mixture onto water. The obtained cloudy solution is made alkaline with conc. sodium hydroxide, saturated with sodium chloride and extracted three times with methylene chloride. the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acidic with saturated ethanolic hydrochloric acid. On cooling and if desired diluting with ether the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine - dihydrochloride of m.p. 255—256° precipitates.

EXAMPLE 16

38.1 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2-N. sodium hydroxide. It is extracted with methylenechloride. To the methylenechloride solution which has been dried over sodium sulfate are added 50.5 g triethylamine. Thereafter one drops at room temperature a solution of 7.9 g acetylchloride in 100 ml methylencchloride within 20 minutes to the reaction solution. After stirring for one hour at room temperature, it is washed with 100 ml 2-N. sodium hydroxide and twice with 100 ml water. The queous phases are extracted twice with methylenechloride. The combined methylenechloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isopropyl - imid - azolidine which melts after recrystallization from ethyl acetate at 133—135°.

EXAMPLE 17

38.1 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2 - N. sodium hydroxide. It is extracted with methylene chloride. To the methylene chloride solution which has been dried over sodium-sulfate are added 50.5 g triethylamine. To this solution one drops at room temperature a solution of 9.3 g propionic acid chloride in 100 ml methylene chloride within 20 minutes. After stirring the solution for one hour at room temperature it is washed with 100 ml 2-N. sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylene chloride. The combined methylene chloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine which after recrystallization melts at 111—112°.

EXAMPLE 18

a) 38.1 g 1 - [*p* - (2 - amino - ethyl) - phenylsulphonyl] - 2 - imino - 3 - isopropyl - imidazolidine-dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2-N .sodium hydroxide. It is extracted with methylene chloride. To the methylene chloride solution which has been dried over sodium sulfate are added 50.5 g triethylamine. Thereafter one drops in the solution at room temperature a solution of 10, g butyric acid chloride in 100 ml methylene chloride within 20 minutes. After stirring the solution for one hour at room temperature it is washed with 100 ml 2-N. sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylene chloride. The combined methylene chloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine which after recrystallization from ethyl acetate melts at 139—140°.

In an analogous way one obtains from 38.1 g 1 - [*p* - (2 - amino - ethyl) - phenyl - sulphonyl] - 2 - imino - 3 - isopropyl - imidazolidine - dihydrochloride and;

10.7 g butyrylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine, m.p. 139—140°;

12.1 g valeric acid chloride the 1 -[*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine, m.p. 123—124°;

10.5 g cyclopropancarbonic acid chloride the 1 - [*p* - (2 - cyclopropan - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - iso - propyl - imidazolidine, m.p. 114—116°;

15.5 g *o* - toluylchloride the 1 - [*p* - [2 - (2 - toluamido - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine, m.p. 132—134°;

17.5 g *o* - chlorbenzoylchloride the 1 - [*p* - [2 - (2 - chlorbenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine, m.p. 132—134°;

10.5 g 1 - methacryloylchloride the 1 - [*p* - [2 - (1 - methacryl - amido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine . $1H_2O$ m.p. 106—107°;

b) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine - dihydrochloride is obtained according two methods for preparation:

1) 35.2 g 1 - [2 - acetamino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine are dissolved in 370 ml 2-N.

hydrochloric acid and the solution is refluxed for 6 hours. The solution is then evaporated *in vacuo* to dryness, and the oil obtained dissolved in ethanol. On cooling the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine - di - hydrochloride crystallizes, m.p. 249—250°.

2) A mixture of 100 ml dimethylsulfoxide, 11.2 g pulverized potassium hydroxide, 23.65 g *p* - (2 - amino - ethyl) - phenyl sulfon - amide - hydrochloride [lit.: E. Miller et al. J. am. chem. Soc. 62, 2101, (1940)] and 16 g N - (2 - chloro - ethyl) - N - isopropyl - cyanamide are refluxed for one hour in an oil bath of 110°. After cooling one pours the mixture onto water. The obtained cloudy solution is made alkaline with conc. sodium hydroxide, saturated with sodium chloride and extracted three times with methylene chloride; the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acidic with saturated ethanolic hydrochloride acid. On cooling and if desired diluting with ether the 1 - [*p* - (2 - amino - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine - dihydrochloride of m.p. 249—250° precipitates.

Example 19

a) 39.7 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2N sodium hydroxide. It is extracted with methylene chloride. To the methylene chloride solution dried over sodium sulfate are added 50.5 g triethylamine. Thereafter one drops to the solution at room temperature the solution of 7.9 g acetyl chloride in 100 ml methylene chloride within 20 minutes. After stirring the solution for 1 hour at room temperature it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylene chloride. The combined methylene chloride phases yield after drying with sodium sulfate, filtering and evaporating 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine which after recrystallisation from ethyl acetate melts at 130—131°.

In analogous way one obtains from 39.7 g 1 - [*p* - (2 - amino - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - butyl - imidazol - idine - hydrochloride and

10.7 g butyrylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 123—124°;

13.0 g 2 - methyl - butyrylchloride the 1 - [*p* - (*α* - methyl - butyramido - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 114—116°;

13.0 g valeric acid chloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 130°;

13.0 g isovaleric acid chloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 130—130.5°;

14.5 g caproyl chloride the 1 - [*p* - (2 - capronamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 129—130°;

17.5 g caprylic acid chloride the 1 - [*p* - (2 - octanamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 130—131°;

18.9 g *o* - chloro - benzoyl chloride the 1 - [*p* - [2 - (2 - chlorobenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 155—157°;

17.1 g *o* - methoxybenzoyl chloride the 1 - [*p* - [2 - (2 - methoxybenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 145—146°;

18.8 g *p* - chlorphenyl - acetyl chloride the 1 - [*p* - (2 - [2 - (4 - chlorphenyl) - acetamido] - ethyl - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 163—164°;

19.7 g 2 - phenyl - butyryl chloride the 1 - [*p* - [2 - (2 - phenyl - butyramido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 127—128°;

12.5 g 1 - ethyl - propionyl chloride the 1 - [*p* - [2 - (1 - ethyl - propionamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 125—126°;

9.2 g acrylolyl chloride the 1 - [*p* - (2 - acrylamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 153—154°;

22.1 g 2 - methoxy - 5 - chloro - benzoyl chloride the 1 - [*p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - butyl - imidazol - idine, m.p. 94—97°;

18.0 g 3 - methoxy - benzoyl chloride the 1 - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 139—141°;

16.5 g 1 - methyl - 3 - cyclohexane - carbonic acid chloride the 1 - [*p* - [2 - (1 - methyl - 3 - cyclohexane - carboxamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 149—150°;

22.0 g 3, 4 - dimethoxy - benzoyl - chloride the 1 - [*p* - [2 - (3, 4 - dimethoxy - benz - amido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, m.p. 169—170°;

b) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulphonyl] - 2 - imino - 3 - butyl - imidazolidine - dihydrochloride is obtained accordingly after two methods:

1) 36.65 g 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine are dissolved in 370 ml 2N hydrochloric acid and the solution is refluxed for 6 hours. The solution is then evaporated in vacuum to dryness and the obtained oil dissolved in ethanol. On cooling the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine - dihydrochloride crystallises, m.p. 231—233°.

2) A mixture of 100 ml dimethylsulfoxide, 11.2 g pulverized potassium hydroxide, 23.65 g *p* - (2 - amino - ethyl) - benzene - sulfonamide hydrochloride [lit.: E. Miller et al, J. am. chem. Soc. 62, 2101, (1940)] and 16 g N - (2 - chlor - ethyl) - N - butyl - cyanamide are heated in an oil bath of 110° while stirring for 1 hour. After cooling one pours the mixture onto water. The obtained cloudy solution is made alkaline with concentrated sodium hydroxide, saturated with sodium chloride and extracted three times with methylene chloride; the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acid with saturated ethanolic hydrochloric acid. On cooling and if desired diluting with ether the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine - dihydrochloride of m.p. 231—233° precipitates.

Example 20

41.5 g 1 - [2 - amino - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine - dihydrochloride - monohydrate are dissolved in 200 ml water and the base is liberated with 300 ml 2N sodium hydroxide. It is extracted with methylene chloride. To the methylene chloride solution which has been dried over sodium sulfate are added 50.5 g triethylamine. Thereafter one drops at room temperature the solution of 10 g propionic acid chloride in 100 ml methylene chloride within 20 minutes to the solution. After stirring the solution for 1 hour at room temperature it is washed with 100 ml 2N sodium hydroxide, and twice with 100 ml water. The aqueous phases are extracted twice with methylene chloride. The combined methylene chloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, which melts at 140—142° after recrystallisation from ethyl acetate.

In analogous way one obtains from 41.5 g 1 - [*p* - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine - dihydrochloride - monohydrate and:

11.7 g butyric acid chloride the 1 - [*p* - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - isobutyl - imidazolidine, m.p. 138—139°;

13.0 g valeric acid chloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 137—140°;

13.0 isovaleric acid chloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 150—152°;

13.0 g pivaloyl chloride the 1 - [*p* - (2 - pivalamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 165—167°;

14.4 g hexanoyl chloride the 1 - [*p* - (2 - hexanamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 139—140°;

10.5 g cyclopropan - carbonic acid chloride the 1 - [*p* - (2 - cyclopropan - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 163—164°;

15.6 g cyclohexan - carbonic acid chloride the 1 - [*p* - (2 - cyclohexan - carboxamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 175—177°;

16.7 g *o*-toluoyl chloride the 1 - [*p* - (2 - toluamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 138—140°;

18.4 g *o* - methoxy - benzoyl chloride the 1 - [*p* - [2 - (2 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 110—111°;

22.3 g 2 - methoxy - 5 - chloro - benzoyl chloride the 1 - [*p* - [2 - (methoxy - 5 - chloro - benzamido) - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 117—119°;

18.3 g 3, 4 - dimethyl - benzoyl chloride the 1 - [*p* - [2 - (3, 4 - dimethyl - benz - amido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 158.5—160°;

23.7 g *o* - bromo - benzoyl chloride the 1 - [*p* - [2 - (2 - bromo - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 158—160°;

20.4 g *p* - chlorine - phenyl - acetyl chloride the 1 - [*p* - [2 - (4 - chloro - phenyl - acetamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 175—176°;

22.4 g 2, 4 - dichlorine - benzoyl chloride the 1 - [*p* - [2 - (2, 4 - dichloro - benz - amido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 102.5—104°;

10.2 g aceticanhydride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine, m.p. 149—151°;

a) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino -

3 - isobutyl - imidazolidine - dihydro - chloride - monohydrate is obtained according to two methods:

1) 36.65 g 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine are dissolved in 370 ml 2N hydrochloric acid and the solution is refluxed for 6 hours. The solution is then evaporated in vacuum to dryness and the obtained oil dissolved in ethanol. On cooling the 1 - [*p* - (2 - amino - ethyl) - benzene - sulfonyl] - 2 - imino - 3 - isobutyl - imid - azolidine - hydrochloride - monohydrate, m.p. 151—152° C, crystallises.

2) A mixture of 100 ml dimethyl sulfoxide, 11.2 g pulverized potassium hydroxide 23.65 g *p* - (2 - amino - ethyl) - benzene - sulfonamide - hydrochloride [lit.: E. Miller et al, J. Am. Chem. Soc. 62, 2101, (1940)] and 20.5 g N - (2 - bromo - ethyl) - N - isobutyl - cyanamide are heated while stirring for 1 hour in an oil bath at 110°. After cooling one pours the mixture onto water. The obtained cloudy solution is made alkaline with concentrated sodium hydroxide, saturated with sodium chloride and extracted three times with methylene chloride; the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acidic with saturated ethanolic hydrochloric acid. On cooling and if desired diluting with ether the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine - di - hydrochloride - monohydrate precipitates, m.p. 151—152°.

Example 21

39.1 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. - butyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2N sodium hydroxide. It is extracted with methylene chloride. To the methylene chloride solution which has been dried over sodium sulfate are added 50.5 g triethyl amine. Thereafter one drops to the solution at room temperature the solution of 12.9 g valeric acid chloride in 100 ml methylene chloride within 20 minutes. After stirring the solution for 1 hour at room temperature it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted with methylene chloride. The combined methylene chloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. - butyl - imidazolidine - hemihydrate, which melts at 111—113° after recrystallisation from ethyl acetate.

In an analogous way one obtains from 39.7 g 1 - [*p* - (2- amino - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine - dihydro chloride and:

7.9 g acetyl chloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 106—108°;

9.2 g propionyl chloride the 1 - [*p* - (2 - propionamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 125—126°;

11 g butyryl chloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 123—124°;

17.2 g cyclohexyl - acetyl chloride the 1 - [*p* - (2 - cyclohexyl - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 111—113°;

18.5 g *p* - ethoxybenzoyl chloride the 1 - [*p* - [2 - (4 - ethoxybenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 148—149.5°;

16.9 g 2, 4 - dimethyl benzoyl chloride the 1 - [*p* - [2 - (2, 4 - dimethyl - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 120—122°;

22.8 g 3 - methyl - O - acetyl - salicylic acid chloride the 1 - [*p* - [2 - (3 - methyl - salicylamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - sec. - butyl - imidazolidine, m.p. 203.5—205°;

24.2 g 2 - methoxy - 5 - tert. butyl - benzoyl chloride the 1 - [*p* - [2 - (2 - meth - oxy - 5 - tert. butyl - benzamido] - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 106—108°;

14.8 g benzoyl chloride the 1 - [*p* - (2 - benzamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine, m.p. 133—135°;

b) The starting material 1 - [*p* - (2 - amino ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine - dihydro - chloride is obtained according to two methods of preparation:

1) 36.6 g 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine are dissolved in 370 m 2N hydrochloric acid and the solution is refluxed for 6 hours. The solution is then evaporated in vacuum to dryness and the obtained oil dissolved in ethanol. On cooling the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine - dihydrochloride crystallises, m.p. 250° (decomposition).

2) A mixture of 100 ml dimethyl sulfoxide, 11.2 g pulverized potassium hydroxide, 23.65 g *p* - (2 - amino - ethyl) - benzene - sulfonamide - hydrochloride [lit.: E. Miller et al, J. Am. Chem. Soc. 62, 2101 (1940)] and 20.5 g N - (2 - bromo - ethyl) - N - sec.

butyl - cyanamide is heated while stirring for 1 hour in an oil bath of 110°. After cooling one pours the mixture onto water. The obtained cloudy solution is made alkaline with concentrated sodium hydroxide, saturated with sodium chloride and extracted three times with methylene chloride; the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acidic with saturated ethanolic hydrochloric acid. On cooling and if desired diluting with ether the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec. butyl - imidazolidine - dihydrochloride precipitates, m.p. 250° (decomposition).

EXAMPLE 22

41.5 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine - monohydrate are dissolved in 200 ml water and the base liberated with 300 ml 2N sodium hydroxide. It is extracted with methylene chloride. To the methylene chloride solution which has been dried over sodium sulfate are added 50.5 g triethyl amine. Thereafter one drops at room temperature to the solution a solution of 7.9 g acetyl chloride in 100 ml methylene chloride within 20 minutes. After stirring the solution for 1 hour at room temperature it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylene chloride. The combined methylene chloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine which melts at 127—129° after recrystallisation from ethyl acetate.

EXAMPLE 23

a) 41.5 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine - dihydrochloride - monohydrate are dissolved in 200 ml water and the base is liberated with 300 ml 2N sodium hydroxide. It is extracted with methylene chloride. To the methylene chloride solution which has been dried over sodium sulfate are added 50.5 g triethyl amine. Thereafter one drops to this solution at room temperature the solution of 13 g isovaleric acid chloride in 100 ml methylene chloride within 20 minutes. After stirring the solution for 1 hour at room temperature it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylene chloride. The combined methylene chloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - isovaleramido - ethyl - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine which melts at 152—154° after recrystallisation from ethyl acetate.

In an analogous way one obtains from 41.5 g 1 - [*p* - (2 - amino - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine - dihydrochloride - monohydrate and:

13.0 g pivaloylchloride the 1 - [*p* - (2 - pivalamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 140—142°;

13.7 g 2 - chlorpropionyl chloride the 1 - [*p* - [2 - (2 - chlorpropionamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 151—153°;

15.2 g 2 - chlorbutyryl chloride the 1 - [*p* - [2 - (2 - chlorbutyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 142—144°;

15.8 g cyclohexane-carbonic acid chloride the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 176—178°;

22.5 g α, α, α - trifluor - *m* - toluoyl chloride the 1 - [*p* - (2 - α, α, α - trifluor - *m* - toluamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 172—173°;

16.6 g *o*-toluoyl chloride the 1 - [*p* - [2 - toluamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 160—161°;

18.9 g *o*-chlorbenzoyl chloride the 1 - [*p* - [2 - (2 - chlorobenzamido) - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 152—154°;

22.1 g 2 - methoxy - 5 - chloro - benzoyl chloride the 1 - [*p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - tert. butyl - imid - azolidine, m.p. 124—126°;

22.6 g 3, 4 - dichloro - benzoyl chloride the 1 - [*p* - [2 - (3, 4 - dichloro - benz - amido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 168—170°;

24.5 g 3, 4, 5 - trimethoxy benzoyl chloride the 1 - [*p* - [2 - (3, 4, 5 - trimethoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 130—132°;

18.2 g 2, 5 - dimethylbenzoyl chloride the 1 - [*p* - [2 - (2, 5 - dimethyl - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 152—154°;

11.6 g butyryl chloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - amino - 3 - tert. butyl - imidazolidine, m.p. 148—149°;

18.0 g 2 - methoxy - benzoyl chloride the 1 - [*p* - [2 - (2 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine, m.p. 131—131.5°;

b) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine - dihydro -

chloride - monohydrate is obtained according to two methods for preparation:

1) 36.65 g 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine are dissolved in 370 ml 2N hydrochloric acid and the solution is refluxed for 6 hours. The solution is then evaporated in vacuum to dryness and the obtained oil dissolved in ethanol. On cooling the 1 - [*p* - (2 - amino - ethyl) - benzene - suufonyl] - 2 - imino - 3 - tert. butyl - imidazolidine - dihydrochloride - monohydrate crystallises, m.p. 232—234°.

2) A mixture of 100 ml dimethyl sulfoxide, 11.2 g pulverized potassium hydroxide, 23.65 g *p* - (2 - amino - ethyl) - phenyl - sulfonamide - hydrochloride [lit.: E. Miller et al, J. Am. Chem. Soc. 62, 2101 (1940)[and 16 g N - (2 - chloro - ethyl) - N - tert. butyl - cyanamide are heated for 1 hour while stirring in an oil bath of 110°. After cooling one pours the mixture onto water. The obtained cloudy solution is made alkaline with concentrated sodium hydroxide, saturated with sodium chloride and extracted three times with methylene chloride; the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acetic with ethanolic hydrochloric acid. On cooling and if desired diluting with ether the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert. butyl - imidazolidine - dihydrochloride - monohydrate precipitates, m.p. 232—234°.

EXAMPLE 24

40.9 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclo - pentyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2N-sodium hydroxide. It is extracted with methylene chloride. To the methylene chloride solution which has been dried over sodium sulfate are added 50.5 g triethyl amine. Thereafter one drops in to the solution at room temperature a solution of 13.0 g n-valeryl-chloride in 100 ml methylene chloride within 20 minutes. After stirring the solution for 1 hour at room temperature it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylene chloride. The combined methylene chloride phases yield after drying with sodium sulfate, filtrating and evaporating the 1 - [p - (2- valeramido - ethyl) - phenylsulphonyl] - 2 - imino - 3 - cyclo - pentyl - imidazolidine, which after recrystallisation from acetone melts at 132—134°.

In an analogous way one obtains from 40.9 g 1 - [*p* - (2 - amino - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclopentyl - imid - azolidine - dihydrochloride and:

11 g butyryl chloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 138—139°;

14.5 g *n* - hexanoyl - chloride the 1 - [*p* - (2 - hexanamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 118—119°;

15.8 g cyclohexane carbonic acid chloride the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 178—179°;

81 g acetyl chloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 151—152°;

18.5 g 2 - chlorobenzoyl chloride the 1 - [*p* - [2 - (2 - chloro - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclo - pentyl - imidazolidine, m.p. 187—190.5;

22.5 g 2, 4 - dichlorobenzoyl chloride the 1 - [*p* - [2 - (2, 4 - dichloro - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 151.5—153°;

16.5 g 1 - methyl - 3 - cyclohexene - carbonic acid the 1 - [*p* - [2 - (1 - methyl - 3 - cyclohexene - carboxamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 129—131°;

16.2 g 1 - methyl - cyclohexane - carbonic acid chloride the 1 - [*p* - [2 - (1 - methyl - cyclohexancarboxamido) - ethyl] - phenyl-sulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 130—131°;

17.6 g 3 - methoxy - benzoyl - chloride the 1 - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 146.5—148°;

20.8 g 3, 4 - dimethoxy - benzoyl - chloride the 1 - [*p* - [2 - (3, 4 - dimethoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine, m.p. 180—182°;

b) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine - dihydro - chloride is obtained according to two methods of preparation:

1) 37.8 g 1 - [*p* - (2 - acetamino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine are dissolved in 370 ml 2N hydrochloric acid and the solution is refluxed for 6 hours. The solution is then evaporated in vacuum to dryness and the obtained oil dissolved in ethanol. On cooling the 1 - [p - (2 - amino ethyl) - benzene - sulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine - dihydrochloride crystallises, m.p. 270°.

2) A mixture of 100 ml dimethyl sulfoxide,

11.2 g pulverized potassium hydroxide, 23.65 g *p* - (2 - amino - ethyl) - phenylsulfon - amide - hydrochloride [lit.: E. Miller et al, J. Am. Chem. Soc. 62, 2101, (1940)] and 17.2 g N - (2 - chlorine - ethyl) - N - cyclo - pentyl - cyanamide is heated while stirring for 1 hour in an oil bath of 110°. After cooling one pours the mixture onto water. The obtained cloudy solution is made alkaline with concentrated sodium hydroxide, saturated with sodium chloride and extracted three times with methylene chloride; the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acidic with saturated ethanolic hydrochloric acid. On cooling and if desired diluting with ether the 1 - [*p* - (2 - amino - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine - dihydrochloride, m.p. 270° (decomposition) precipitates.

Example 25

a) 42.3 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2-N-sodium hydroxide. It is extracted with methylenechloride. To the methylenechloride solution which has been dried with sodium sulfate 50.5 g triethylene are added. To this solution are dropped at room temperature a solution of 9.3 g propionic acid chloride in 100 ml methylenechloride within 20 minutes. After stirring the solution for 1 hour at room temperarature it is washed with 100 ml 2N-sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylenechloride. The combined methylenechloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine - hemihydrate which melts at 110 to 112° if recrystallized from ethyl acetate.

Accordingly one obtains from 42.3 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine - dihydrochloride and:

8.0 g acetylchloride the 1 - [*p* - (2 - acetylamido - ethyl) - phenylsulfonyl] - 2 - amino - 3 - cyclohexyl - imidazolidine m.p. 181—183°;

10.7 g butyrylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine - hemi - hydrate m.p. 143—144°;

12.1 g valerylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 154—155°;

12.1 g isovalerylchloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 180—181°;

10.5 g cyclopropane - carboxylic acid chloride the 1 - [*p* - (2 - cyclopropane - carboxamidoethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 172—173°;

18.4 g 3 - cyclohexyl - propionylchloride the 1 - [*p* - [2 - (3 - cyclohexyl - propion - amido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclo - hexyl - imidazolidine m.p. 168—169°;

17.5 g cinnamic acid chloride the 1 - [*p* - (2 - cinnamic - acid - amido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 182—183°;

15.0 g α - chlorbutyrylchloride the 1 - [*p* - (2 - α - chlorbutyramido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 158—159°;

16.4 g *o* - toluylchloride the 1 - [*p* - [2 - toluamido - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 198—199°;

18.5 g *o*-chlorbenzoylchloride the 1 - [*p* - [2 - (2 - chlorbenzamido) - ethyl] - phenyl - sulfonyl - 2 - imino - 3 - cyclohexyl - imid - azolidine m.p. 191—192°;

18.0 g *o* - methoxybenzoylchloride the 1 - [*p* - [2 - (2 - methoxy - benzamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 175—176°;

18.0 g *m* - methoxy - benzoylchloride the 1 - [*p* - [2 - (3 - methoxy - benzamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 167—168°;

17.8 g 2, 5 - dimethylbenzoylchloride the 1 - [*p* - [2 - (2, 5 - dimethyl - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclo - hexyl - imidazolidine m.p. 186—187°;

19.4 g *p* - ethoxy - benzoylchloride the 1 - [*p* - [2 - (4 - ethoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 156—157.5°;

23.0 g *o* - brombenzoylchloride the 1 - [*p* - [2 - (2 - brombenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 179—181°;

15.0 g 2 - ethyl - butyrylchloride the 1 - [*p* - [2 - (2 - ethyl - butyramido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 169—170°;

17.5 g 3 - cyclohexyl - propionylchloride the 1 - [*p* - [2 - (2 - cyclo - hexyl - propionamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 168—169°;

18.2 g *p* - methoxy - benzoylchloride the 1 - [*p* - [2 - (4 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 153—154°;

19.1 g 2 - methylthio - benzoylchloride the 1 - [*p* - [2 - (2 - methylthio - benzamido) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 184—186°;

21.5 g 3, 4 - dichlor - benzoylchloride the 1 - [*p* - [2 - (3, 4 - dichlor - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 227—228°;

21.0 g 2 - methoxy - 5 - chlorobenzoyl - chloride the 1 - [*p* - [2 - (2 - methoxy - 5 - chlorobenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 167—170;

16.5 g 1 - methyl - 3 - cyclohexene - carbonic acid chloride the 1 - [*p* - [2 - (1 - methyl - 3 - cyclohexene - carboxamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 158—160°;

16.5 g 4 - methyl - 3 - cyclohexene - carbonic acid chloride the 1 - [*p* - [2 - (4 - methyl - 3 - cyclohexene - carboxamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 200—201°;

15.0 g cyclohexane carbonic acid chloride the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazoline m.p. 208—209°;

16.3 g 1 - methyl - cyclohexane - carbonic acid chloride the 1 - [*p* - [2 - (1 - methyl - cyclohexane - carboxamido) - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 162—163°;

21.1 g 3, 4 - dimethoxy - benzoyl - chloride the 1 - [*p* - [2 - (3, 4 - dimethoxy - benz - amido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 203—250°;

b) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine - dihydro - chloride is prepared according to two different methods:

a) 39.2 g 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine are dissolved in 370 ml 2-N hydrochloric acid and the solution is refluxed for 6 hours. The solution is evaporated *in vacuo* and the oil obtained dissolved in ethanol. On cooling the 1 - [*p* - (2 - amino ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclo - imidazolidine - dichloride crystallizes m.p. 247—250°.

b) A mixture of 100 ml dimethylsulfoxide, 11.2 g pulverized potassium hydroxide, 23.65 g *p* - (2 - amino - ethyl) - benzenesulfonamide hydrochloride [lit.: *E. Miller et al.*, J.Am.Chem. Soc. *62*, 2101, (1940)] and 23.1 g N - (2 - brom - ethyl) - N - cyclohexyl - cyanamide are heated while stirring for 1 hour in an oil bath of 110°. After cooling one pours the mixture onto water. The obtained cloudy solution is made alkaline with concentrated sodium hydroxide, saturated with sodium chloride and three times extracted with methylenechloride; the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acidic with saturated hydrochloric acid in ethanol. On cooling and if desired diluting with ether the 1 - [*p* - (2 - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine-dihydrochloride m.p. 247—250° precipitates.

Example 26

a) According to example 25 a) one obtains from 43.7 g 1 - [*p* - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine - dihydrochloride and 7.9 g acetylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenyl - sulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 166—167°.

From the same amino compound one obtains from:

11.0 g butyrylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 144.5—145°;

12.3 g valerylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 145—147°;

18.2 g 3 - methoxybenzoylchloride the 1 - [p - [2 - (3 - methoxybenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 164.5°;

17.8 g 2,4 - dimethylbenzoylchloride the 1 - [*p* - [2 - (2,4 - dimethylbenzamido) - ethyl] - phenylsulfonyl - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 187—189°;

17.5 g 3,4 - dimethyl - benzoyl - chloride the 1 - [*p* - [2 - (3,4 - dimethoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 208—210°.

b) The starting material 1 - [*p* - (amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine - dihydrochloride is prepared according to example 25 b) from 40.6 g 1 - [*p* - (2 - acetamino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine - dihydrochloride m.p. 280° (decomposition).

Example 27

a) 41.1 g 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2 - N sodium hydroxide. It is extracted with methylenechloride. To the methylenechloride solution which has been dried over sodium sulfate are added 50.5 g triethylamine. Thereafter one drops in to this solution at room temperature a solution of 13 g isovalerylchloride in 100 ml methylenechloride within 20 minutes. After the solution has been stirred for 1 hour

at room temperature it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylenechloride. The combined methylenechloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (3 - isovaleramido - propyl) - phenyl - sulfonyl] - 2 - imido - 3 - butyl - imidazolidine which melts at 101—103° if recrystallized from ethyl acetate.

In an analogous way one obtains from 41.1 g 1 - [*p* - (3 - aminopropyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine and:

22.0 g 2 - methoxy - 5 - chlorobenzoylchloride the 1 - [*p* - [3 - (2 - methoxy - 5 - chlorobenzamido) - propyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine as oil and from

18.2 g 3,5 - dimethyl - benzoylchloride the 1 - [p - [3,5 - dimethyl - benzamido) - propyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine, M.P. 96—100°.

The starting material 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine - dihydrochloride can be obtained according to two different methods:

a) 38.0 g 1 - [*p* - (3 - acetamido - propyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine are dissolved in 370 ml 2N hydrochloride acid and the solution is refluxed for 6 hours. The solution is evaporated *in vacuo* to dryness and the oil obtained is dissolved in ethanol. On cooling the 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine - dihydrochloride crystallizes as very hydroscopic crystals.

b) A mixture of 100 ml dimethylsulfoxide, 11.2 g pulverized potassium hydroxide, 250 g *p* - (3 - amino - propyl) - benzene - sulfonamide - hydrochloride [Lit.: E. Müller, Angew.Chemie, *61*, 179, (1949)] and 16 g N - (2 - chlor - ethyl) - N - butyl - cyanamide is heated for 1 hour in an oil bath of 110° while stirring. After cooling one pours the mixture onto water. The obtained cloudy solution is made alkaline with concentrated sodium hydroxide, saturated with sodium chloride and extracted with methylenechloride three times; the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acidic with saturated ethanolic hydrochloric acid. On cooling and if desired dilution with ether the 1- [p - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine - dihydrochloride precipitates as very hygroscopic crystals.

Example 28

a) 41.1 g 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2N sodium hydroxide. It is extracted with methylenechloride. To the methylenechloride solution which has been dried over sodium sulfate are added 50.5 triethylamine. To this solution is dropped at room temperature a solution of 13 g pivaloyl-chloride in 100 ml methylenechloride within 20 minutes. After the solution has been stirred at room temperature for 1 hour it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylenechloride. The combined methylenechloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (3 - pivalamido - propyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine which melts after recrystallization from ethyl acetate at 112—113°.

b) The starting material 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine - dihydrochloride can be obtained according to two methods:

a) 38.0 g 1 - [*p* - (3 - acetamido - propyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine are dissolved in 370 ml 2N hydrochloric acid and the solution is refluxed for 6 hours. The solution is evaporated *in vacuo* and the oil obtained the 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine - dihydrochloride used in the crude state.

b) A mixture of 100 ml dimethylsulfoxide, 11.2 g pulverized potassium hydroxide, 25.0 g *p* - (3 - amino - propyl) - benzene - sulfonamide - hydrochloride [Lit.: E. Müller Angew.Chemie, 61, 179, (1949)] and 20.5 g N - (2 - bromoethyl) - N - isobutyl - cyanamide is heated while stirring for 1 hour in an oil bath of 110°C. After cooling one pours the mixture onto water. The obtained cloudy solution is extracted with concentrated sodium hydroxide; the organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acidic with saturated ethanolic hydrochloric acid. After evaporating one obtains the 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] 2 - imino - 3 - isobutyl - imidazolidine - dihydrochloride as an oil.

Example 29

41.1 g 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - tert. - butyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is

liberated with 300 ml 2N sodium hydroxide. It is extracted with methylenechloride. To the methylenechloride solution which has been dried over sodium sulfate are added 50.5 g triethylamine. To this solution is dropped at room temperature a solution of 18.2 g 3,4 - dimethyl - benzoylchloride in 100 ml methylenechloride within 20 minutes. After the solution has been stirred for 1 hour at room temperature it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylenechloride. The combined methylenchloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (3,4 - dimethyl - benzamido) - propyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine which melts after recrystallizing from ethyl acetate at 144—146°.

b) The starting material 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine - dihydrochloride is obtained according to two methods:

1) 38.0 g 1 - [*p* - (3 - acetamido - propyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl imidazolidine are dissolved in 370 ml 2N hydrochloric acid and the solution is refluxed for 6 hours. The solution is then evaporated *in vacuo* to dryness and the oil obtained the 1 - [*p* - (3 - amino - propyl) - benzene - sulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine - dihydrochloride used in the crude state.

2) A mixture of 100 ml dimethylsulfoxide, 11.2 g pulverized potassium hydroxide, 25.0 g *p* - (3 - amino - propyl) - benzene - sulfonamide - hydrochloride [lit.: E. Müller, Angew.Chem., 61, 179, (1949)] and 16 g N - (2 - chlor - ethyl) - N - tert.butyl - cyanamide is heated while stirring for 1 hour in an oil bath at 110°. After cooling one pours the mixture to water. The obtained cloudy solution is made alkaline with concentrated sodium hydroxide, saturated with sodium chloride and extracted three times with methylenechloride. The organic phases are dried over sodium sulfate, filtered and evaporated. The obtained oil (free base) is dissolved in ethanol and made acidic with saturated ethanolic hydrochloric acid. After evaporating one obtains the 1 - [*p* - (3 - amino - propyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine - dihydrochloride as an oil.

Example 30

a) 41.1 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine - dihydrochloride are dissolved in 200 ml water and the base is liberated with 300 ml 2N - sodium hydroxide. It is extracted with methylenechloride. To the methylenechloride solution which has been dried over sodium sulphate are added 50.5 g triethylamine. To this solution is dropped at room temperature a solution of 12.7 g valeryl chloride in 100 ml methylenechloride within 20 minutes. After the solution has been stirred at room temperature for 1 hour it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylenechloride. The combined methylenechloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine which melts after recrystallization from ethyl acetate at 108—110°C.

Accordingly one obtains from 41.1 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 -methyl - imidazolidine - dihydrochloride and:

12.7 g isovalerylchloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine m.p. 102—103°;

15.4 g cyclohexane - carboxylic chloride the 1 - [*p* - (2 - cyclohexan - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine m.p. 137—139°;

16.3 g *o* - toluoylchloride the 1 - [*p* - [2 - (2 - toluamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine - hemihydrate m.p. 103—105°;

23.7 g *o* - bromobenzoylchloride the 1 - [*p* - [2 - (2 - bromobenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine m.p. 100—102°;

18.0 g 3,5 - dimethyl - benzoylchloride the 1 - [*p* - [2 - (3,5 - dimethyl - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine m.p. 138—140°;

7.9g acetylchloride the 1 - [*p* - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl imidazolidine m.p. 132—133°;

18.2 g 2,4 - dimethyl - benzoylchloride the 1 - [*p* - [- (2,4 - dimethyl - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine. $\frac{1}{4}$ H_2O m.p. 108—110°;

b) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine - dihydrochloride is prepared according to the following method:

38.0 g 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine are dissolved in 370

ml 2N - hydrochloric acid and the solution is refluxed for 6 hours. The solution is then evaporated *in vacuo* to dryness and the oil obtained dissolved in alcohol. On cooling the 1 - [*p* - (amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 -methyl - imidazolidine - dihydrochloride crystallizes m.p. 240° (decomposition).

EXAMPLE 31

a) According to example 30 a) one obtains from 41.1 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine and:

7.9 g acetylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine m.p. 98—99°;

12.5 g valerylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine m.p. 95—97°;

12.5 g isovalerylchloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine m.p. 131—133°;

14.1 g 2 - ethyl - butyrylchloride the 1 - [*p* - [2 - (2 - ethylbutyramido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine m.p. 89—90°;

16.5 g 2 - toluoylchloride the 1 - [*p* - [2 - (2 - toluamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine m.p. 122—124;

22.0 g 2 - bromobenzoylchloride the 1 - [*p* - (2 - bromobenzamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine m.p. 105—107°;

15.5 g cyclohexane carboxylic acid chloride the 1 - [*p* - [2 - cyclohexane - carboxamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine m.p. 127—129°.

b) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine - dihydrochloride is prepared according to example 29 b) from 38.0 g 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine - dihydrochloride m.p. 255—257°.

EXAMPLE 32

a) According to example 30 a) one obtains from 43.7 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - 5 - methyl - imidazolidine - dihydrochloride and 10.7 g butyrylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - 5 - methyl - imidazolidine m.p. 109—111°.

b) The starting material 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - 5 - methyl - imidazolidine - dihydrochloride is obtained according example 29 b) from 40.6 g 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - 5 - methyl - imidazolidine - dihydrochloride as an oil.

EXAMPLE 33

42.5 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine - dihydrochloride are dissolved in 300 ml water and the base is liberated with 300 ml 2N sodium hydroxide. It is extracted with methylenechloride. To the methylenechloride solution which has been dried with sodium sulfate are added 50.5 g trimethylamine. To this solution is dropped at room temperature a solution of 13 g valeryl-chloride in 100 ml methylenechloride within 20 minutes. After the solution has been stirred for one hour at room temperature it is washed with 100 ml 2N sodium hydroxide and twice with 100 ml water. The aqueous phases are extracted twice with methylenechloride. The combined methylenechloride phases yield after drying with sodium sulfate, filtering and evaporating the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine recrystallized from ether/ethyl acetate, it melts at 92—94°.

In an aqueous way one obtains from 42.5 g 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine - dichloride and:

11.5 g isobutyrylchloride the 1 - [*p* - (2 - isobutyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine as an oil;

13.0 g pivaloylchloride the 1 - [*p* - pivalamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine m.p. 140—142°;

15.2 g 2 - chlorobutyrylchloride the 1 - [*p* - [2 - (2 - chloro - butyramido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine as an oil;

22.6 g 2,5 - dichlorobenzoylchloride the 1 - [*p* - [2 - (2,5 - dichlorbenzamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine as an oil.

b) The starting material 1 - [2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine - dihydrochloride is obtained according to the following method:

39.4 g 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine are dissolved in 370 ml 2N hydrochloric acid and the solution is refluxed for 6 hours. The solution is evaporated *in vacuo* to dryness and the oil obtained

dissolved in ethanol. On cooling the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl) - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine - dihydrochloride crystallizes m.p. 222—224°.

EXAMPLE 34

28 ml 4-N sodium hydroxide and 4.3 g ethylenimine are cooled to —10°. To this solution is then added a suspension of 26.2 g p - (2 - acetamidoethyl) - phenylsulfonylchloride in 100 ml acetone while stirring and cooling so that the temperature does not rise above 0°. After the addition is finished stirring is continued for 30 minutes at 0°. Thereafter the cooling bath is removed and to the solution of the obtained 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - aziridine are added 100 ml n-propylamine. The temperature rises to 40—50°. The reaction mixture is stirred for another hour and finally the excess of amine is distilled off on the rotary evaporator. The crystalline paste containing beside sodium chloride the desired N_1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl) - N_2 - n - propyl - ethylenediamine is dissolved in 56 ml 2N sodium hydoxide and to this solution is added portion-wise while stirring 10.6 g bromocyanogen whereby the temperature is not allowed to rise above 40°. After 1 hour the obtained compound is extracted with methylenechloride, washed with 20 ml 2N sodium hydroxide and twice with 100 ml. water. After drying and evaporating off the methylenechloride solution the residue is recrystallized from ethyl acetate and yields the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine m.p. 138—140°.

EXAMPLE 35

28 ml 4N sodium hydroxide and 4.3 g ethyleneimine are cooled to —10°. Thereafter a suspension of 27.6 g *p* - (2 - propionamidoethyl) - phenylsulfonylchloride in 100 ml acetone is added to the solution while stirring and cooling whereby the temperature is not allowed to rise over 0°. After addition to the solution is finished it is stirred for another 30 minutes at 0°. Thereafter the cooling bath is removed and to the solution obtained of the 1 - [p - (2 - propionamido - ethyl) - phenylsulfonyl] - aziridine are added 100 ml propylamine. The temperature rises to 40—50°. The reaction mixture is stirred for another hour and thereafter the excess of amine is distilled off on the rotary evaporator. The crystalline paste which contains beside sodium chloride the desired N_1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - N_2 - propyl - ethylendiamine is dissolved in 56 ml 2N-sodium hydroxide and to this solution are added portion-wise while stirring 10.6 g bromocyanogen whereby the temperature is not allowed to rise above 40°. After 1 hour the obtained compound is extracted with methylenechloride, washed with 20 ml 2N sodium hydroxide and twice with 100 ml water. After drying and evaporating of the methylenechloride solution the residue is recrystallized from ethyl acetate and yields the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine m.p. 127—128°.

In analogous manner one obtains from 100 ml propylamine and 29 g *p* - (2 - butyramido - ethyl) - phenylsulfonylchloride the 1 - [2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazoladine m.p. 114—116°.

EXAMPLE 36

28 ml 4N sodium hydroxide and 4.3 g ethyleneimine are cooled to —10°. Thereafter a suspension of 35.5 g *p* - [2 - methoxybenzamido) - ethyl] - phenylsulfonylchloride in 100 ml acetone while stirring and cooling is added so that the temperature does not rise above 0°. After the addition is finished stirring is continued for 30 minutes at 0°. Thereafter the cooling bath is removed and to the solution of the obtained [2 - (2 - methoxy - benzamido - ethyl) - phenylsulfonyl] - aziridine are added 100 ml propylamine. The temperature rises to 40—50°. The reaction mixture is stirred for another hour and thereafter the excess of amine is distilled off on the rotary evaporator. The crystalline paste which contains beside sodium chloride the desired N_1 - [*p* - [2 - (2 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - N_2 - n - propyl - ethylendiamine is dissolved in 56 ml 2N sodium hydroxide and to this solution is added while stirring portion wise 10.6 g bromocyanogen whereby the temperature does not rise above 40°. After 1 hour the obtained compound is extracted with methylenechloride, washed with 20 ml 2N sodium hydroxide and twice with 100 ml water. After drying and evaporating off the methylenechloride solution the residue is recrystallized from ethyl acetate and yields the 1 - [*p* - [2 - (2 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine m.p. 144—147°.

In an analogous manner one obtains from 4.3 g ethylenimine and:

100 ml isopropylamine and 26.2 g *p* - (2 - acetamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl - 2 - imino - 3 - isopropyl - imidazolidine m.p. 133—135°;

100 ml isopropylamine and 27.6 g *p* - (propionamido - ethyl) - phenylsulfonylchorlide the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine m.p. 111—112°;

100 ml isopropylamine and 29 g *p* - (2 -

butyramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine m.p. 139—140°;

100 ml butylamine and 26.2 g *p* - (2 - acetamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 130—131;

100 ml butylamine and 30.6 g [2 - (α - methyl - butyramido) - ethyl] - phenylsulfonylchloride the 1 - [*p* - [2 - (α - methylbutyramido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 114—116°;

100 ml butylamine and 30.6 g *p* - (2 - valeramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 130°;

100 ml isobutylamine and 30.6 g *p* - (2 - valeramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p.. 137—140°;

100 ml isobutylamine and 38.9 g *p* - [2 - (2 - methoxy - 5 - chlor - benzamido) - ethyl] - phenylsulfonylchloride the 1 - [*p* - [2 - methoxy - 5 - chlor - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p. 117—119°;

100 ml isobutylamine and 33.0 g *p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p. 175—177°;

100 ml sec.butylamine and 26.2 g *p* - (2 - acetamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine m.p. 106—108°;

100 ml sec.butylamine and 27.6 g *p* - [2 - propionamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec - butyl - imidazolidine m.p. 125—126°;

100 ml sec.butylamine and 29.0 g *p* - (2 - butylamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine m.p. 123—124;

100 ml tert.butylamine and 26.2 g p - (2 - acetamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 127—128°;

100 ml tert.butylamine and 27.6 g - (2 - propionamido - ethyl) - phenylsulfonylchloride the 1 - [p - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 150—152°.

Example 37

28 ml 4N sodium hydroxide and 4.3 g ethylenimine are cooled to —10°. Thereafter a suspension of 29.0 g *p* - (2 - butyryl - amidoethyl) - phenylsulfonylchloride in 100 ml acetone is added while stirring and cooling so that the temperature does not rise above 0°. After the addition is finished it is stirred for another 30 minutes at 0°. Thereafter the cooling bath is removed and to the solution of the obtained 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - aziridine are added 100 ml tert.butylamine. The temperature rises to 40—50°. The reaction mixture is stirred for another hour and thereafter the excess of amine is distilled off on the rotary evaporator. The crystalline paste which contains besides sodium chloride the desired N_1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N_2 - tert.butyl - ethylendiamine is dissolved in 56 ml 2N sodium hydroxide and to this solution are added while stirring portion-wise 10.6 g bromocyanogen whereby the temperature is not allowed to rise above 40°. After 1 hour the obtained compound is extracted with methylenechloride, washed with 20 ml 2N sodium hydroxide and twice with 100 ml water. After drying and evaporating of the methylenechloride solution the residue is recrystallized from ethyl acetate and yields the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 148—149°.

In analogous way one obtains from 4.3 g ethylenimine and:

100 ml tert.butylamine and 30.6 g *p* - (2 - α - methylbutyramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - α - methylbutyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 156—157°;

100 ml tert. butylamine and 30.6 g *p* - (2 - isovaleramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 152—153°;

100 ml. tert.butylamine and 35.5 g *p* - [2 - (2 - methoxybenzamido) - ethyl] - phenylsulfonylchloride the 1 - [*p* - [2 - (2 - methoxybenzamido) - ethyl] - phenylsufonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 134—136°;

100 ml tert.butylamine and 39.0 g *p* - [2 - (2 - methoxy - 5 - chlorbenzimido) - ethyl] - phenylsulfonylchloride the 1 - [*p* - [2 - (2 - methoxy - 5 - chlorobenzamide) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 124—126°;

100 ml cyclopentylamine and 30.6 g *p* - (2 - valeramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine m.p. 132—134°;

100 ml cyclopentylamine and 29.0 g *p* - (2 - butyramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - butyramido -

ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine m.p. 138—139°;

100 ml cyclopentylamine and 33.0 g *p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - penylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine m.p. 178—179°;

100 ml cyclohexylamine and 24.8 g *p* - (2 - formamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - 2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 135—136°;

100 ml cyclohexylamine and 26.2 g *p* - (2 - acetamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 181—183°;

100 ml cyclohexylamine and 29.0 g *p* - [2 - N - methylacetamido) - propyl] - phenylsulfonylchloride the 1 - [*p* - [2 - (N - methyl - acetamido) - propyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 108—110°;

100 ml cyclohexyl amine and 27.6 g *p* - (2 - propionamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - propionamido - ethyl) - phenyl - sulfonyl]- 2 - imino - 3 - cyclohexyl - imidazolidine. ½ H_2O m.p. 110—112°;

100 ml cyclohexylamine and 29.0 g *p* - (2 - butyramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino- - 3 - cyclohexyl - imidazolidine. ½ H_2O m.p. 143—144°;

100 ml cyclohexylamine and 30.4 g *p* - (2 - valeramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine. ½ H_2O m.p. 154—155°;

100 ml cyclohexylamine and 30.4 g *p* - (2 - isovaleramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 180—181°;

100 ml cyclohexylamine and 35.4 g *p* - [2 - (2 - methoxy - benzamido) - ethyl] - phenylsulfonylchloride the 1 - [*p* - [2 - (2 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 105—107°;

100 ml cyclohexylamine and 33.0 g *p* - (2 - cyclohexyl - carboxyamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - cyclohexyl - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 167—168°;

100 ml cycloheptylamine and 26.2 g *p* - (2 - acetamido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 166—167°;

100 ml cycloheptylamine and 29.0 g *p* - (2 - butyramido - ethyl) - phenylsulfonylchloride the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 144.5—145°;

Example 38

28 ml 4N sodium hydroxide and 5.7 g propylenimine are cooled to —10°. Thereafter a suspension of 29.0 g *p* - (2 - butyramido - ethyl) - phenylsulfonylchloride in 100 ml acetone is added while stirring and cooling so that the temperature does not rise above 0°. After the addition is finished the reaction mixture is stirred for 30 minutes at 0°. Then the cooling bath is removed and to the solution of the obtained 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - methyl - aziridine are added 100 ml cyclohexylamine. The temperature rises to 40—50°. The reaction mixture is stirred for 1 hour and thereafter the excess of amine is distilled off on the rotary evaporator. The crystalline paste which contains besides sodium chloride the desired N^1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N^2 - cyclohexyl - (1 - methyl - ethylendiamine) is dissolved in 56 ml 2N sodiumhydroxide and to this solution is added while stirring portion-wise 10.6 g bromocyanogen whereby the temperature is not allowed to rise above 40°. After 1 hour the obtained compound is extracted with methylenechloride, washed with 20 ml 2N sodium hydroxide and twice with 100 ml water. After drying and evaporating of the methylenechloride solution the residue is recrystallized from ethyl acetate and yields the 1 - [p - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - 5 - methyl - imidazolidine m.p. 109—111°.

Example 39

28 ml 4N sodium hydroxide and 5.7 g propylenimine are cooled to —10°. Thereafter a suspension of 26.2 g *p* - (2 - acetamido - ethyl) - phenylsulfonylchloride in 100 ml aectone is added while stirring and cooling so that the temperature does not rise above 0°. After the addition is finished the reaction mixture is stirred for 30 minutes at 0°. Then the cooling bath is removed and to the solution of the obtained 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - methyl - aziridine are added 100 ml butylamine. The temperature rises to 40—50°. The reaction mixture is stirred for 1 hour and thereafter the excess of amine is distilled off on the rotary evaporator. The crystalline paste which contains besides sodium chloride the desired N' - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - N^2 - butyl - (1 - methyl - ethylenediamine is dissolved in 56 ml 2N sodium hydroxide and to this solution is

added while stirring portion-wise 10.6 g bromocyanogen whereby the temperature is not allowed to rise above 40°. After 1 hour the obtained compound is extracted with methylenechloride, washed with 20 ml 2N sodium hydroxide and twice with 100 ml water. After drying and evaporating of the methylenechloride solution the residue is recrystallized from ethyl acetate and yields the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methylimidazolidine m.p. 98—99°.

EXAMPLE 40

To a mixture of 4 g sodium hydroxide, 15 ml water and 300 ml dimethylsulfoxide one dissolves 28.4 g *p* - (2 - isovaleramido - ethyl) - benzene - sulfonamide and 16 g N - (2 - chloro - ethyl) - N - butyl - cyanamide. The obtained solution is refluxed for 1 hour (bath temperature: 110°). The dimethylsulfoxide is distilled off *in vacuo* and the residue, a brown oil is taken up in methylenechloride. The organic phase is washed three times with water, dried and filtered and yields after evaporating brown crystals. After recrystallization from ethyl acetate one obtains the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 130—130.5°;

In an analogous way one obtains from:

14.7 g N - (2 - chlor - ethyl) - N - propyl - cyanamide and 27.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl) - 2 - imino - 3 - propyl - imidazolidine m.p. 114—116°;

14.7 g N - (2 - chloro - ethyl) - N - propyl - cyanamide and 33.4 g *p* - [2 - (3 - methoxy - benzamido) - ethyl] - benzenesulfonamide the 1 - [*p* - [2 - (3 - methoxybenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propylimidazolidine m.p. 144—147°;

14.7 g N - (2 - chloro - ethyl) - N - isopropyl - cyanamide and 25.6 g *p* - (2 - propionamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropylimidazolidine m.p. 111—112°;

14.7 g N - (2 - chloro - ethyl) - N - isopropyl - cyanamide and 27.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazodine m.p. 139—140°;

16.0 g N - (2 - chloro - ethyl) - N - butyl - cyanamide and 24.2 g *p* - (2 - acetamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 130—131°;

16.0 g N - (2 - chloro - ethyl) - N - butyl - cyanamide and 28.4 g *p* - (2 - methyl - butyramido - ethyl) - benzenesulfonamide the 1 - [*p* - [2 - (2 - methyl - butyramido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 114—116°;

16.0 g N - (2 - chloro - ethyl) - N - butyl - cyanamide and 28.4 g *p* - (2 - valeramido - ethyl) - benzenesulfonamide the 1 - [p - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 130°;

16.0 g N - (2 - chloro - ethyl) - N - butyl - cyanamide and 33.9 g *p* - [2 - (2 - chlorobenzamido) - ethyl] - benzenesulfonamide the 1 - [*p* - [2 - (2 - chlorobenzamido) - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 155—157°;

16.0 g N - (2 - chloro - ethyl) - N - butyl - cyanamide and 37.2 g *p* - [1 - (α,α,α - trifluoro - m - toluyl - amido) - ethyl] - benzenesulfonamide the 1 - [*p* - (α,α,α - trifluoro - *m* - toluyl - amido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine as an oil;

16.0 g N - (2 - chloro - ethyl) - N - isobutyl - cyanamide and 28.4 g *p* - (2 - valeramido - ethyl) - benzenesulfonamide the 1 - [p - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p. 130°;

16.0 g N - (2 - chloro - ethyl) - N - isobutyl - cyanamide and 36.9 g *p* - [2 - (2 - methoxy - 5 - chlorobenzamido) - ethyl] - benzenesulfonamide the 1 - [*p* - [2 - (2 - methoxy - 5 - chlorobenzamido) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p. 117—119°;

16.0 g N - (2 - chloroethyl) - N - isobutyl - cyanamide and 30.9 g *p* - (2 - cyclohexane - carboxamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - cyclohexane - carboxamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p. 175—177°;

16.0 g N - (2 - chloroethyl) - N - sec - butyl - cyanamide and 24.2 g *p* - (2 - acetamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine m.p. 106—108°;

16.0 g N - (2 - chloroethyl) - N - sec.butyl - cyanamide and 25.6 g *p* - (2 - propionamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine m.p. 125—126°;

16.0 g N - (2 - chloroethyl) - N - sec.butyl - cyanamide and 27.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine m.p. 123—124°;

16.0 g N - (2 - chloroethyl) - N - tert.butyl - cyanamide and 24.2 g *p* - (2 -

acetamido - ethyl) - benesulfonamide the 1 - [*p* - (2 - acetamido - ethyl) - benzenesulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 127—128°;

16.0 g N - (2 - chloroethyl) - N - tert.butyl - cyanamido and 27.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 148—149°.

Example 41

To a mixture of 4 g sodium hydroxide, 15 ml water and 300 ml dimethylsulfoxide one dissolves 28.4 *p* - (2 - isovaleramido - ethyl) - benzene - sulfonamide and 16 g N - (2 - chloroethyl) - N - tert.butyl - cyanamide. The obtained solution is refluxed for 1 hour (bath temperature: 110°). The dimethylsulfoxide is distilled off *in vacuo* and the residue, a brown oil is taken up in methylene chloride. The organic phase is washed three times with water, dried and filtered and yields after evaporating brown crystals. After recrystallization from ethyl acetate one obtains the 1 - [*p* - (2 - isovaleramido - ethyl) - benzenesulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 152—154°.

In an analogous way one obtains from:

16.0 g N - (2 - chloroethyl) - N - tert.butyl - cyanamide and 31.8 g *p* - [2 - (2 - toluylamido) - ethyl] - benzenesulfonamide the 1 - [*p* - [2 - (2 - toluylamino) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 160—161°;

16.0 g N - (2 - chloroethyl) - N - tert.butyl - cyanamide and 33.8 g *p* - [2 - (2 - chloro - benzamido) - ethyl] - benzenesulfonamide the 1 - [*p* - [2 - (2 - chloro - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 152—154°;

16.0 g N - (2 - chloroethyl) - N - tert.butyl - cyanamide and 39.6 g *p* - [2 - (3,4,5 - trimethoxy - benzamido) - ethyl] - benzenesulfonamide the 1 - [*p* - [2 - (3,4,5 - trimethoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 130—132°;

16.0 g N - (2 - chloroethyl) - N - tert.butyl cyanamide and 25.6 g *p* - (3 - acetamido - propyl) - benzenesulfonamide the 1 - [*p* - (3 - acetamido - propyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 106—108°;

16.0 g N - (2 - chloroethyl) - N - tert.butyl - cyanamide and 33.8 g *p* - [1 - (2 - chlorobenzamido) - ethyl] - ethyl] - benzenesulfonamide the 1 - [*p* - [1 - (2 - chlorobenzamido) - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 166—168°;

17.4 g N - (2 - chloroethyl) - N - cyclopentyl - cyanamide and 27.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine m.p. 138—139°;

17.4 g N - (2 - chloroethyl) - N - cyclopentyl - cyanamide and 28.4 g *p* - (2 - valeramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine m.p. 132—134°;

17.4 g N - (2 - chloroethyl) - N - cyclopentyl - cyanamide and 30.9 g *p* - (cyclohexane - carboxamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine m.p. 178—179°;

18.8 g N - (2 - chloroethyl) - N - cyclohexyl - cyanamide and 22.8 g *p* - (2 - formamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 135—136°;

18.8 g N - (2 - chloroethyl) - N - cyclohexyl - cyanamide and 24.2 g *p* - (2 - acetamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p.. 181—183°;

18.8 g N - (2 - chloroethyl) - N - cyclohexyl - cyanamide and 27.0 g *p* - [2 - (N - methyl - acetamido) - propyl] - benzenesulfonamide the 1 - [*p* - [2 - (N - methyl - acetamido) - propyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 108—110°;

18.8 g N - (2 - chloroethyl) - N - cyclohexyl - cyanamide and 25.6 g *p* - (2 - propionamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine. $\frac{1}{2}$ H_2O m.p. 110—112°;

18.8 g N - (2 - chloroethyl) - N - cyclohexyl - cyan amide and 27.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine. $\frac{1}{2}$ H_2O m.p. 143—144°;

18.8 g N - (2 - chloroethyl) - N - cyclohexyl - cyanamide and 28.4 g *p* - (2 - valeramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine. $\frac{1}{4}$ H_2O m.p. 154—155°;

18.8 g N - (2 - chloroethyl) - cyclohexyl - cyanamide and 28.4 g *p* - (2 - isovaleramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 180—181°;

18.8 g N - (2 - chloroethyl) - N - cyclohexyl - cyanamide and 33.9 g *p* - [2 - methoxy - benzamido) - ethyl] - benzenesulfonamide the 1 - [*p* - [2 - (2 - methoxy - benzamido) - ethyl)] - phenylsulfonyl] - 2 -

imino - 3 - cyclohexyl - imidazolidine m.p. 178—179°;

18.8 g N - (2 - chloroethyl) - N - cyclohexyl - cyanamide and 30.9 g *p* - (2 - cyclohexane - carboxamido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 167—168°;

20.2 g N - (2 - chloroethyl) - N - cycloamide and 24.2 g *p* - (2 - acetamido - ethyl) - benzenesulfonamide the 1 - [*p* - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 166—167°;

20.2 g N - (2 - chloroethyl) - N - cycloheptyl - cyanamide and 27.0 g *p* - (2 - butyramido - ethyl) - benzenesulfonamide the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 144.5—145°;

EXAMPLE 42

a) 38.8 g N - [*p* - (2 - propionamidoethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide are dissolved in 200 ml ethanol and refluxed with 12 g n - propylamine for 1 hour. Thereafter the reaction mixture is evaporated on a rotary evaporator. The residue is diluted with 50 ml ethyl acetate and extracted twice with 80 ml 2n hydrochloric acid. The aqueous phase is made alkaline with 2N sodium hydroxide and extracted twice with 100 ml methylenechloride. The methylenechloride solution is washed with water, dried and evaporated. The residue is crystallized from ethyl acetate and yields the pure 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine m.p. 130—131°.

In an analogous way one obtains from:

40.2 g N - [*p* - (2 - butyramidoethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 12.0 g propylamine the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazoldine. 1 H_2O m.p. 114—116°;

46.6 g N - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 12.0 g propylamine the 1 - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine m.p. 144—147°;

38.8 g N - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 12.0 g isopropylamine the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine m.p. 111—112°;

40.2 g N - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N - 2 - bromo - ethyl - cyanamide and 12.0 g isopropylamine the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine m.p. 139—140°;

37.4 g N - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - N - 2 - bromo - ethyl - cyanamide and 14.6 g butylamine the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - butyl.imidazolidine m.p. 130—131°;

38.8 g N - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - N - 2 - bromo - ethyl - cyanamide and 14.6 g butylamine the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 137—138°;

41.6 g N - [*p* - [2 - (2 - methyl - butyramido) - ethyl] - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 14.6 g butylamine the 1 - [*p* - [2 - (2 - methyl - butyramido) - ethyl] - phenylsulfonyl] - 2 - amino - 3 - butyl - imidazolidine m.p. 114—116°;

41.6 g N - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 14.6 g butylamine the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 130°;

41.6 g N - [*p* - (2 - valeramido - ethyl - phenylsulfonyl] - N - 2 - bromo - ethyl - cyanamide and 14.6 g isobutyl - amine the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p. 130°;

50.0 g N - [*p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 14.6 g isobutylamine the 1 - [*p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p. 117—119°;

42.8 g N - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 14.6 g isobutylamine the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p. 175—177°;

37.4 g N - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - N - 2 - bromo - ethyl - cyanamide and 14.6 g sec.butylamine the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine m.p. 106—108°;

38.8 g N - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - N - 2 - bromo - ethyl - cyanamide and 14.6 g sec.butylamine the 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine m.p. 125—126°;

40.2 g N - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N - 2 - bromo - ethyl - cyanamide and 14.6 g sec.butylamine the 1 - [*p* - (2 - butyramido - ethyl) - phenyl-

sulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine m.p. 123—124°;

40.2 g N - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N - 2 - bromo - ethyl - cyanamide and 14.6 g tert.butylamine the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 148—149°;

41.6 g N - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 14.6 g tert.butylamine the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 152—154°;

41.6 g - N - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - N - 2 - bromo - ethyl - cyanamide and 17 g cyclopentylamine the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopenyl - imidazolidine m.p. 132—134°;

40.2 g N - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 17 g cyclopentylamine the 1 [*p* - (2 - butyramidoethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine m.p. 138—139°;

44.2 g N - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl -cyanamide and 17 g cyclopentylamine the 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine m.p. 178—179°.

b) The starting material is obtained in the following way:

To 10.6 g cyanogen bromide in 40 ml ether are dropped at —10° 4.3 g ethyleneimine in 20 ml ether. To the formed insoluble 2 - bromoethyl-cyanamide is added a suspension of 27.6 g *p* - (2 - propionamido - ethyl) - phenylsulfonylchloride in 100 ml acetone. To the reaction mixture are added dropwise thereafter 52 ml 2N sodium hydroxide and the mix is stirred for 1 hour at room temperature. Then the ether and acetone are removed in the rotary evaporator. The residue is extracted with methylenechloride. The solution is washed twice with 20 ml water, dried and evaporated. The N - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide so obtained is a light yellow oil.

Other not isolated starting materials are obtained in an analogous way from 10.6 g cyanogen bromide and 4.3 g ethylenimine and:

26.2 g *p* - (2 - acetamido - ethyl) - phenylsulfonylchloride the N - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide;

29.0 g *p* - (2 - butyramido - ethyl) - phenylsulfonylchloride the N - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethylcyanamide;

30.4 g *p* - [2 - (2 - methyl - butyramido - ethyl] - phenylsulfonylchloride the N - [*p* - [2 - (2 - methylbutyramido) - ethyl] - phenylsulfonyl] - N - 2 - bromoethyl-cyanamide;

30.4 g *p* - (2 - valeramido - ethyl) - phenylsulfonylchloride the N - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethylcyanamide;

30.4 g *p* - (2 - isovaleramido - ethyl) - phenylsulfonylchloride the N - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide;

35.5 g *p* - [2 - (3 - methoxybenzamido) - ethyl] - phenylsulfonylchloride the N - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - N - 2 - bromoethyl-cyanamide;

39.0 g *p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - phenylsulfonylchloride the N - [*p* - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - phenylsulfonyl] - N - 2 - bromoethylcyanamide.

Example 43

a) 38.8 g N - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide in 200 ml ethanol and 19.8 g cyclohexylamine are refluxed for 1 hour. Thereafter the reactor mixture is evaporated on the rotary evaporator. The residue is diluted with 50 ml ethyl acetate and extracted two times with 80 ml 2N hydrochloric acid. The aqueous phase is made alkaline with 2N sodium hydroxide and extracted twice with 100 ml methylene chloride. The methylenechloride solution is washed with water, dried and evaporated. The residue crystallizes from ethyl acetate and yields the pure 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imido - 3 - cyclohexyl - imidazolidine - hemihydrate m.p. 110—112°.

In an analogous way on obtains from:

36.0 g N - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] N - 2 - bromoethyl - cyanamide and 19.8 g cyclohexylamine the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 135—136°;

37.4 g N - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 19.8 g cyclohexylamine the 1 - [*p* - (2 - acetamido - ethyl - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 181—183°;

40.2 g N - [*p* - (2 - N - methyl - acetamido - propyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 19.8 g cyclohexylamine the 1 - [*p* - (2 - N - methyl-acetamido - propylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 108—110°;

40.2 g N - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 19.8 g cyclohexylamine the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine. 1 H_2O m.p. 143—144°;

41.6 g N - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl-cyanamide and cyclohexylamine the 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine. $\frac{1}{4}$ H_2O m.p. 154.155°;

41.6 g N - [*p* - isovaleramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and cyclohexylamine the 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 180—181°;

46.6 g N - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - N - 2 - bromoethylcyanamide and cyclohexylamine the 1 - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 167—168°;

42.8 g N - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and cyclohexylamine the 1 - [*p* - [2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine m.p. 167—168°;

37.4 g N - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and cycloheptylamine the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 166—167°;

40.2 g N - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and cycloheptylamine the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine m.p. 144.5—145°;

37.4 g N - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 22.8 g tert.octylamine the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.octyl - imidazolidine m.p. 131—135°;

37.4 g N - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 11.4 g allylamine and 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - allyl - imidazolidine m.p. 127—129°;

40.2 g N - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 11.4 g allylamine the 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - allyl - imidazolidine m.p. 122—124°;

37.4 g N - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide and 24.2 g phenylamine the 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - phenethyl - imidazolidine m.p. 148—150°;

b) The starting materials not isolated are obtained according to example 42 b) from 10.6 g cyanogen bromide and 4.3 g ethylenimine and:

24.8 g - *p* - (2 - formamido - ethyl) - phenylsulfonylchloride the N - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl - cyanamide;

27.6 g *p* - (2 - N - methyl - acetamido - ethyl) - phenylsulfonylchloride the N - [*p* - (2 - N - methyl - acetamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethyl-cyanamide;

32.6 g *p* - [2 - cyclohexane - carboxamido - ethyl) - phenylsulfonylchloride the N - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - N - 2 - bromoethylcyanamide.

EXAMPLE 44

To 42.4 g 1 - [*p* - (2 - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine - dihydrochloride are added 110 ml 2N - sodium hydroxide and the liberated base is extracted with methylene-chloride. To the dried solution are added 14.6 g chloral. After 30 minutes the solvent is distilled off. The residue is heated at 12 to 15 mm Hg for 10 minutes to *circa* 65° and thereafter dissolved in hot ethyl acetate. After cooling the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine crystallizes. It melts at 135—136°.

In an analogous way one obtains from 14.7 g chloral and:

31.0 g 1 - [*p* - (2 - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine m.p. 103—104°;

31.0 g 1 - [*p* - (2 - iminoethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine the - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine m.p. 112—113°;

32.4 g 1 - [*p* - (2 - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl-imidazolidine the 1 - [*p* - (2 - formamido-ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 111—112°;

32.4 g 1 - [*p* - (2 - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine m.p. 107—108°;

36.4 g 1 - [*p* - 2 - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 -

cycloheptyl - imidazolidine m.p. 130—133°;

36.4 g 1 - [*p* - (2 - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - (2 - methyl - cyclohexyl) - imidazolidine the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (2 - methyl - cyclohexyl) - imidazolidine m.p. 127—129°;

36.4 g 1 - [*p* - (2 - imino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (4 - methyl - cyclohexyl) - imidazolidine the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (4 - methyl - cyclohexyl - imidazolidine m.p. 126—128°;

33.6 g 1 - [*p* - (2 - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopenyl - imidazolidine the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine m.p. 108—110°;

42.1 g 1 - [*p* - (2 - aminoethyl) - phenylsulfonyl] - 2 - imino - 3 - (3 - cyclohexen - 1 - yl) - imidazolidine the 1 - [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (3 - cyclohexen - 1 - yl) - imidazolidine m.p. 116—118°.

Example 45

a) According to examples 15 a) to 33 a) one obtoins by acylation:

1 - [*p* - [2 - (2 - methoxy - 5 - chloro - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - methyl - imidazolidine m.p. 140—141°;

1 - [*p* - (2 - acetamido - propyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine m.p. 120—122°;

1 - [*p* - (N - methyl - acetamido) - propyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine. H_2O m.p. 80—82°;

1 - [*p* - [1 - (2 - chlorobenzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine m.p. 166—168°;

1 - [*p* - (2 - butylamido - ethyl) - phenyl sulfonyl] - 2 - imino - 3 - allyl - imidazolidine m.p. 122—124°;

1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - hexyl - imidazolidine m.p. 136—137°;

1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - hexyl - imidazolidine m.p. 124—126°;

1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (2 - methyl-cyclohexan - 1 - yl) - imidazolidine m.p. 134—135°;

1 - [*p* - [2,3 - (methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - (2 - methyl - cyclohexan - 1 - yl) - imidazolidine m.p. 175—176°; 1 - [*p* - [2 - (3,4 - dimethoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - (2 - methyl - cyclohexan - 1 - yl) - imidazolidine m.p. 184—186°;

1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (3 - cyclohexen - 1 - yl) - imidazolidine m.p. 171—173°;

1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (3 - cyclohexen - 1 - yl) - imidazolidine m.p. 127—129°;

1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - phenethyl - imidazolidine m.p. 148—150°;

1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - phenethyl - imidazolidine m.p. 136—138°;

1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - phenethyl - imidazolidine m.p. 122—123°;

1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (1 - methyl - 2 - phenethyl) - imidazolidine m.p. 118—121°;

1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (1 - methyl - 2 - phenethyl) - imidazolidine m.p. 126—128°;

1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - 5 - methyl - imidazolidine m.p. 121—122°;

1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - 5 - methyl - imidazolidine m.p. 149—151°;

1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - 5 - methyl - imidazolidine m.p. 132—133°;

1 - [*p* - (2 - (3 - cyclohexyl - propionamido) - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - 5 - methyl - imidazolidine m.p. 110—111°;

1 - [*p* - (2 - acrylamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - 5 - methyl - imidazolidine m.p. 128—129°;

1 - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - (3 - cyclohexen - 1 - yl) - imidazolidine m.p. 153—154°;

1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (4 - methyl - cyclohexan - 1 - yl) - imidazolidine m.p. 135—136°;

1 - [*p* - [2 - (1 - methyl - 3 - cyclohexene - carboxamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - (4 - methyl - cyclohexan - 1 - yl) - imidazolidine m.p. 137—138.5°;

1 - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - (4 - methyl - cyclohexan - 1 - yl) - imidazolidine m.p. 155—158°;

1 - [*p* - [2 - (3,4 - dimethoxy - benzamido) - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - (4 - methyl - cyclohexan - 1 - yl) - imidazolidine m.p. 193—195°;

1 - [*p* - (2 - acrylamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (3 - cyclohexen - 1 - yl) - imidazolidine m.p. 160—161°;

b) The amino compounds which are necessary for the reaction as starting materials are described in the examples 15 b) to 33 b)

or are obtained according to examples 15 b) to 33 b);

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (3 - cyclohexen - 1 - yl) - imidazolidine m.p. 245—247°;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (4 - methylcyclohexan - 1 - yl) - imidazolidine m.p. 260°;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (2 - methylcyclohexan - 1 - yl) - imidazolidine, glass like molten mass;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - hexyl - imidazolidine m.p. 219—222°;

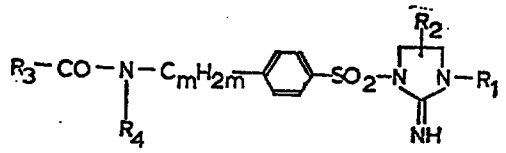
the 1 - [p - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - phenethyl - imidazolidine m.p. 229—236°;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (1 - methyl - 2 - phenethyl) - imidazolidine, glass-like molten mass;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 -allyl - imidazolidine m.p. 232—234°.

WHAT WE CLAIM IS:—

1. *p* - Aminoalkyl - benzenesulfonamide derivatives having the formula I



(I)

wherein

m is 2 or 3;

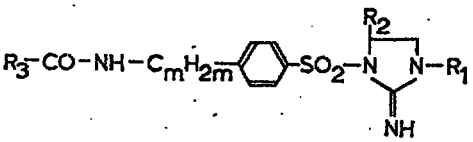
R_1 represents an alkyl group having at most 12 carbon atoms, an alkenyl group having from 3 to 5 carbon atoms, an optionally alkyl-substituted cycloalkyl or cycloalkenyl group having at most 7 carbon atoms, or a phenylalkyl group having at most 9 carbon atoms;

R_2 represents a hydrogen atom or a methyl or ethyl group;

R_3 represents a hydrogen atom, an alkyl or chloroalkyl group having at most 7 carbon atoms, an alkenyl group having at most 5 carbon atoms, an optionally alkyl substituted cycloalkyl or cycloalkenyl group or a cycloalkyl-alkyl group having at most 8 carbon atoms, a phenyl group or a phenylalkyl group or phenylalkenyl group having at most 10 carbon atoms and wherein the phenyl group may be mono-, di- or trisubstituted by halogen up to and including the atomic number 35, t rifluoromethyl, alkyl having at most 4 carbon atoms hydroxy methoxy, ethoxy, methylthio or ethylthio; and

R_4 represents a hydrogen atom or methyl group.

2. *p* - Aminoalkyl - benzenesulfonamide derivatives having the formula Ia



(Ia)

wherein

m is 2 or 3;

R_1 represents an alkyl group having at most 12 carbon atoms, an alkenyl group having from 3 to 5 carbon atoms, a cycloalkyl or cycloalkenyl group having at most 7 carbon atoms, or a phenylalkyl group having at most 9 carbon atoms;

R_2 represents a hydrogen atom or a methyl group; and

R_3 represents an alkyl group having at most 7 carbon atoms, or a phenyl group optionally mono-, di-, or tri-substituted by halogen up to and including the atomic number 35, alkyl having at most 4 carbon atoms, methoxy or ethoxy.

3. The pharmaceutically acceptable acid addition salts of a *p* - aminoalkyl - benzenesulfonamide derivative as claimed in claim 1.

4. The pharmaceutically acceptable acid addition salts of a *p* - aminoalkyl - benzenesulfonamide derivative as claimed in claim 2.

5. 1 - [*p* - (2 - butyramidoethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine.

6. 1 - [p - [2 - (m - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - amino - 3 - propyl - imidazolidine.

7. 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine.

8. 1 - [*p* - (2 - butyramidoethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine.

9. 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine.

10. 1 - [p - [2 - (2 - methyl - butyramido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine.

11. 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonly] - 2 - imino - 3 - butyl - imidazolidine.

12. 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine.

13. 1 - [*p* - [2 - (2 - methoxy - 5 - chloro - benzamido - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine.

or are obtained according to examples 15 b) to 33 b);

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (3 - cyclohexen - 1 - yl) - imidazolidine m.p. 245—247°;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (4 - methylcyclohexan - 1 - yl) - imidazolidine m.p. 260°;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (2 - methylcyclohexan - 1 - yl) - imidazolidine, glass like molten mass;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - hexyl - imidazolidine m.p. 219—222°;

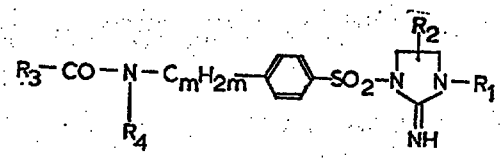
the 1 - [p - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - phenethyl - imidazolidine m.p. 229—236°;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 - (1 - methyl - 2 - phenethyl) - imidazolidine, glass-like molten mass;

the 1 - [*p* - (2 - amino - ethyl) - phenylsulfonyl] - 2 - imino - 3 -allyl - imidazolidine m.p. 232—234°.

WHAT WE CLAIM IS:—

1. *p* - Aminoalkyl - benzenesulfonamide derivatives having the formula I



(I)

wherein

m is 2 or 3;

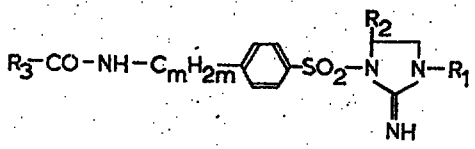
R_1 represents an alkyl group having at most 12 carbon atoms, an alkenyl group having from 3 to 5 carbon atoms, an optionally alkyl-substituted cycloalkyl or cycloalkenyl group having at most 7 carbon atoms, or a phenylalkyl group having at most 9 carbon atoms;

R_2 represents a hydrogen atom or a methyl or ethyl group;

R_3 represents a hydrogen atom, an alkyl or chloroalkyl group having at most 7 carbon atoms, an alkenyl group having at most 5 carbon atoms, an optionally alkyl substituted cycloalkyl or cycloalkenyl group or a cycloalkyl-alkyl group having at most 8 carbon atoms, a phenyl group or a phenylalkyl group or phenylalkenyl group having at most 10 carbon atoms and wherein the phenyl group may be mono-, di- or trisubstituted by halogen up to and including the atomic number 35, t rifluoromethyl, alkyl having at most 4 carbon atoms hydroxy methoxy, ethoxy, methylthio or ethylthio; and

R_4 represents a hydrogen atom or methyl group.

2. *p* - Aminoalkyl - benzenesulfonamide derivatives having the formula Ia



(Ia)

wherein

m is 2 or 3;

R_1 represents an alkyl group having at most 12 carbon atoms, an alkenyl group having from 3 to 5 carbon atoms, a cycloalkyl or cycloalkenyl group having at most 7 carbon atoms, or a phenylalkyl group having at most 9 carbon atoms;

R_2 represents a hydrogen atom or a methyl group; and

R_3 represents an alkyl group having at most 7 carbon atoms, or a phenyl group optionally mono-, di-, or tri-substituted by halogen up to and including the atomic number 35, alkyl having at most 4 carbon atoms, methoxy or ethoxy.

3. The pharmaceutically acceptable acid addition salts of a *p* - aminoalkyl - benzenesulfonamide derivative as claimed in claim 1.

4. The pharmaceutically acceptable acid addition salts of a *p* - aminoalkyl - benzenesulfonamide derivative as claimed in claim 2.

5. 1 - [*p* - (2 - butyramidoethyl) - phenylsulfonyl] - 2 - imino - 3 - propyl - imidazolidine.

6. 1 - [p - [2 - (m - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - amino - 3 - propyl - imidazolidine.

7. 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine.

8. 1 - [*p* - (2 - butyramidoethyl) - phenylsulfonyl] - 2 - imino - 3 - isopropyl - imidazolidine.

9. 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine.

10. 1 - [p - [2 - (2 - methyl - butyramido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - imidazolidine.

11. 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonly] - 2 - imino - 3 - butyl - imidazolidine.

12. 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine.

13. 1 - [*p* - [2 - (2 - methoxy - 5 - chloro - benzamido - ethyl] - phenyl - sulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine.

* C L M S *

14. 1 - [*p* - [2 - cyclohexane - carboxamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - isobutyl - imidazolidine.

15. 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine.

16. 1 - [p - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine.

17. 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - sec.butyl - imidazolidine.

18. 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine.

19. 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - tert.butyl - imidazolidine.

20. 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine.

21. 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine.

22. 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclopentyl - imidazolidine.

23. 1- [*p* - (2 - formamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

24. 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

25. 1 - [*p* - [2 - (N - methyl - acetamido) - propyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

26. 1 - [*p* - (2 - propionamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

27. 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

28. 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

29. 1 - [*p* - (2 - isovaleramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

30. 1 - [*p* - (2 - benzamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

31. 1 - [*p* - [2 - (3 - methoxy - benzamido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

32. 1 - [*p* - (2 - cyclohexane - carboxamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - imidazolidine.

33. 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine.

34. 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cycloheptyl - imidazolidine.

35. 1 - [*p* - (2 - butyramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - cyclohexyl - 5 - methyl - imidazolidine.

36. 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine.

37. 1 - [*p* - (2 - acetamido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 5 - methyl - imidazolidine.

38. 1 - [*p* - (2 - valeramido - ethyl) - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - methyl - imidazolidine.

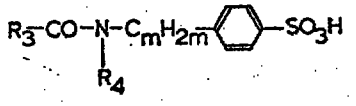
39. 1 - [*p* - [2 - (2 - chlorobutyramido) - ethyl] - phenylsulfonyl] - 2 - imino - 3 - butyl - 4 - ethyl - imidazolidine.

40. The pharmaceutically acceptable acid addition salts of a *p* - aminoalkyl - benzenesulfonamide derivative as claimed in any one of claims 6, 9 and 18.

41. The pharmaceutically acceptable acid addition salts of a *p* - aminoalkyl - benzenesulfonamide derivative as claimed in any one of claims 5, 7, 8, 10 to 12, 15 to 17, 19 to 21, 23 to 29, 33 to 35, and 37.

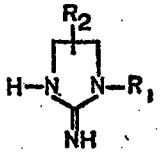
42. The pharmaceutically acceptable acid addition salts of a *p* - aminoalkyl - benzenesulfonamide derivative as claimed in any one of claims 13, 14, 22, 30 to 32, 36, 38 and 39.

43. Process for the production of *p* - aminoalkyl - benzenesulfonamide derivatives having the formula I as defined in claim 1 and their pharmaceutically acceptable acid addition salts, which comprises reacting a reactive functional derivative of a sulfonic acid having the formula II



(II)

wherein *m*, R_3 and R_4 have the meanings given in claim 1 with a compound having the formula III

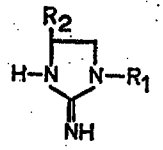


(III)

wherein R_1 and R_2 have the meanings given in claim 1, and when required, converting a p - aminoalkyl - benzenesulfonamide derivative having the formula I thus obtained into a pharmaceutically acceptable acid addition salt thereof.

44. Process for the production of *p* - aminoalkyl - benzenesulfonamide derivatives having the formula Ia as defined in claim 2 and their pharmaceutically acceptable acid addition salts, which comprises reacting a

reactive functional derivative of a sulfonic acid having the formula II as illustrated in claim 43, wherein m and R_3 have the meanings given in claim 2 and R_4 represents a hydrogen atom, with a compound having the formula IIIa



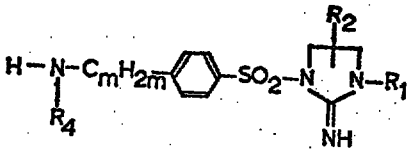
(IIIa)

wherein R_1 and R_2 have the meanings given in claim 2, and, when required, converting a p - aminoalkyl - benzenesulfonamide derivative having the formula Ia thus obtained into a pharmaceutically acceptable acid addition salt thereof.

45. Process for the production of p - aminoalkyl - benzenesulfonamide derivatives having the formula I as defined in claim 1 which comprises reacting an acid having the formula IV

$$R_3—COOH \qquad (IV)$$

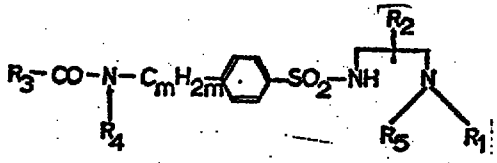
wherein R_3 has the meaning given in claim 1, or a reactive functional derivative thereof, with a compound having the formula V



(V)

wherein m, R_1, R_2 and R_4 have the meanings given in claim 1, and, when required, converting a p - aminoalkyl - benzenesulfonamide derivative having the formula I thus obtained into a pharmaceutically acceptable acid addition salt thereof.

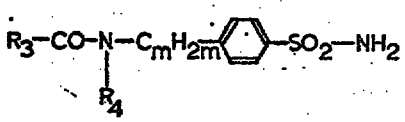
46. Process for the production of p - aminoalkyl - benzenesulfonamide derivatives having the formula I as defined in claim 1 and their pharmaceutically acceptable acid addition salts, which comprises reacting, with ring formation, a compound having the formula VII



(VII)

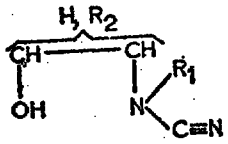
wherein R_1, R_2, R_3, R_4 and m have the meanings given in claim 1 and R_5 represents a hydrogen atom or an arylmethyl, diarylmethyl, methyl or allyl group with a reactive cyanic acid derivative, and, when required, converting a p - aminoalkyl - benzenesulfonamide derivative having the formula I thus obtained into a pharmaceutically acceptable acid addition salt thereof.

47. Process for the production of p - aminoalkyl - benzene sulfonamide derivatives having the formula I as defined in claim 1 and their pharmaceutically acceptable acid addition salts, which comprises reacting, with ring formation, a compound having the formula VIII



(VIII)

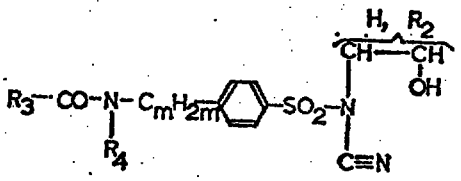
wherein R_3, R_4 and m have the meanings given in claim 1 with a reactive ester of a hydroxy compound having the formula IX



(IX)

wherein R_1 and R_2 have the meanings given in claim 1, and when required, converting a p - aminoalkyl - benzenesulfonamide derivative having the formula I thus obtained into a pharmaceutically acceptable acid addition salt thereof.

48. Process for the production of p - aminoalkyl - benzenesulfonamide derivatives having the formula I as defined in claim 1 and their pharmaceutically acceptable acid addition salts, which comprises reacting, with ring formation, a reactive ester of a compound having the formula X



(X)

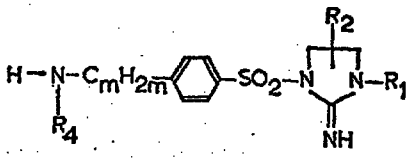
wherein m, R_2, R_3 and R_4 have the mean-

ings given in claim 1, with an amine having the formula XI

$$R_1—NH_2 \qquad (XI)$$

wherein R_1 has the meaning given in claim 1, and, when required, converting a *p* - amino - alkyl - benzenesulfonamide derivative having the formula I thus obtained into a pharmaceutically acceptable acid addition salt thereof.

49. Process for the production of *p* - amino - alkyl - benzenesulfonamide derivatives having the formula I as defined in claim 1, but wherein R_3 may represent a hydrogen atom only, and their pharmaceutically acceptable acid addition salts, which comprises formylating a compound having the formula V



(V)

wherein R_1, R_2, R_4 and *m* have the meanings given in claim 1, with chloral, and, when required, converting a *p* - amino - alkyl - benzenesulfonamide derivative having the formula I thus obtained into a pharmaceutically acceptable acid addition salt thereof.

50. A *p* - amino - alkyl - benzenesulfonamide derivative or pharmaceutically acceptable acid addition salt thereof, whenever prepared by a process as claimed in any one of claims 43 and 45 to 49.

51. A *p* - amino - alkyl - benzenesulfonamide derivative or pharmaceutically acceptable acid addition salt thereof, whenever prepared by a process as claimed in claim 44.

52. A *p* - amino - alkyl - benzenesulfonamide derivative as claimed in claim 1 substantially as hereinbefore described with reference to any one of the accompanying Examples.

53. Process for the production of *p*-amino-alkyl - benzenesulfonamide derivatives as claimed in claim 1 substantially as hereinbefore described with reference to any one of the accompanying Examples.

54. A pharmaceutical composition comprising a *p* - amino - alkyl - benzenesulfonamide derivative as claimed in claim 1, or a pharmaceutically acceptable acid addition salt thereof, together with a pharmaceutically acceptable diluent or carrier therefor.

55. A pharmaceutical composition comprising a *p* - amino - alkyl - benzenesulfonamide derivative as claimed in claim 2, or a pharmaceutically acceptable acid addition salt thereof, together with a pharmaceutically acceptable diluent or carrier therefor.

56. A pharmaceutical composition as claimed in claim 55 substantially as hereininbefore described with reference to the foregoing prescription (a) or (b).

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THE PATENT OFFICE

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